PHASE 1 REPORT:

THE SOCIO-ECONOMIC IMPACTS OF FISHERIES MANAGEMENT AND POLICY DESIGNED TO ACHIEVE BIODIVERSITY CONSERVATION

JOCK CAMPBELL AND BEN CATTERMOUL

November 2009

Prepared for:

The Tubney Charitable Trust

IMM Ltd

The Innovation Centre
Rennes Drive
Exeter EX4 4RN
UK

THE SOCIO-ECONOMIC IMPACTS OF FISHERIES MANAGEMENT AND POLICY DESIGNED TO ACHIEVE BIODIVERSITY CONSERVATION

JOCK CAMPBELL AND BEN CATTERMOUL

November 2009

Integrated Marine Management Ltd
The Innovation Centre
Rennes Drive
Exeter EX4 4RN
UK
www.imm.uk.com

This document was prepared with funds from the Tubney Charitable Trust, First Floor, Front Wing, 30-31 Friar Street, Reading RG1 1DX, UK.

The views expressed in this document do not necessarily reflect the views of the Tubney Charitable Trust.

CONTENTS

1. ACONYMS

ACFM	Advisory Committee for Fisheries Management
CFP	Common Fisheries Policy
DARDNI	Department for Agriculture and Rural Development Northern Ireland
DEFRA	Department for Environment Food and Rural Affairs
ESRC	Economic and Social Research Council
EC	European Community
EEC	European Economic Community
EEZ	Exclusive Economic Zone
EU	European Union
ESSFiN	European Social Science Fisheries Network
FAO	Food and Agriculture Organisation
OECD	Organisation for Economic Co-operation and Development
GDP	Gross Domestic Product
GT	Gross Tonnes
ICES	International Council for the Exploration of the Seas
IFCAs	Inshore Fisheries and Conservation Authorities
IMM	Integrated Marine Management
ITQ	Individual Transferable Quota
MAGPs	Multi Annual Guidance Programmes
MEY	Maximum Economic Yield
MFA	Marine and Fisheries Agency (soon to become part of the Marine Management Organisation)
MJY	Maximum Job Yield
MPA	Marine Protected Area
MSC	Marine Stewardship Council
MSW	Minimum Sustainable Whinge
MSY	Maximum Sustainable Yield
NGO	Non Governmental Organisation
ONS	Office of National Statistics
RAC	Regional Advisory Council
STEFC	Scientific Technical and Economic Committee for Fisheries
SU	Prime Ministers Strategy Unit
TAC	Total Allowable Catch
UK	United Kingdom
UN	United Nations

2. EXECUTIVE SUMMARY

Structure and Organisation

The fisheries sector is having a significant impact upon marine biodiversity in UK waters. Understanding the socio-economic conditions of the fishery and how this is linked to the policies and fisheries management measures in use, will help to improve the effectiveness of the NGOs who are working in the sector.

This report responds to a request from the Tubney Charitable Trust to carry out a basic review of current knowledge of the socio-economic impacts of fisheries management and policy designed to achieve biodiversity conservation. These tools are discusses in Section 2.

A key part of that review (Section 3) is to discuss the importance and diversity of socio-economic knowledge and how it can help to place fisheries into the broader, more holistic, framework of sustainable development. Engaging in the debate about fisheries and biodiversity without an understanding of the socio-economics of fisheries is to do so ill equipped. In reality debating the consequences for marine biodiversity of fisheries without engaging with the socio-economic context and implications of past policies is unlikely to lead to a productive dialogue or to acceptable outcomes.

Placing that socio-economic effects, impacts and context into a framework which makes causal connections between the policy and management measures and how the impacts of those measures manifest themselves was the next stage of the work (Section 4). The framework developed, envisages the policies and management measures having intended impacts. These are then affected by the historic and socio-economic context in which the fishers operate to achieve a set of actual impacts.

Having developed this causal relationship the bulk of the report (Section 5) is divided into four sub-sections: 1) Policy and management strategies; 2) Intended socio-economic impacts; 3) Context, influencing factors and fishers' responses, and 4) Actual socio-economic impacts of policy and management measures.

The first sub-section starts by placing the policies and management measures within a historic context which briefly outlines the evolution of the UK fishery and the policy environment in which it developed. This leads into a discussion of the complexity associated with the policy process and then discuss how the linkages between the *where, how and why* of decision-making influences that complexity. The resulting policy instruments are then briefly outlined.

The second sub-section summarises the intended socio-economic impacts of the EU's Common Fisheries Policy, the UK Government's measures to address the CFP, and how these were translated by the devolved administrations into specific plans and activities. This aims to create an understanding of the intent behind the different policies and measures against which actual outcomes can be assessed.

The third sub-section addresses the contextual filter through which these policies and management measures must pass before they generate outcomes. This context defines the motives and the forces which shape the lives, the attitudes and the actions of the fishers engaged in the sector. They shape and form the incentives that motivate the fishers.

The final sub-section deals with the actual impacts of the policies and management measures. It looks at how these policies have affected the fishery as a whole and what impacts they have had on key socio-economic indicators such as profitability, employment, community structure and risks in the sector. This sub-section also looks at the direct causal linkages between specific impacts and particular policy measures.

Given the context and the way socio-economic change feeds back into policy, this sub-section also looks at the impact of changes in the sector on public perspectives of the sector and on politics.

This review of the socio-economic impacts of fisheries policies and management measures has placed that knowledge in the wider context of fisheries and the policy process, and explains why an understanding of socio-economics is so important to influencing policy.

Findings

The report emphasises the **complexity of the policy environment** and the need to understand the conflicting and contrasting motives of the different stakeholders. Understanding what motivates policy-makers and fishers is the first step to changing their behaviour. The report discusses the **divergence between policy** and **policy implementation,** and the **complexity of policy instruments.**

Whilst the policies themselves are complex, the intended impacts are also often unclear. **Policy conflicts** across specific policy areas confuse the intent of policies and **implementation drift** at the national level creates enough latitude for most people to find what they want to in the policy documents of the national administrations. However, an analysis of policy implementation in the UK would seem to suggest that the policy priority has been maximising the short-term gains to the fishing industry and much less on the long-term sustainability of the resource. Hilborn used the term ***MSW*** or ***minimal sustainable whinge*** to describe the motives that could lead to such a strategy. If this is the case in the UK then it gives an important indication of how NGOs might influence policy in the future.

Even when policy intentions are clear and focussed, their chances of achieving their intended impacts are constrained by a number of factors which affect the context in which policies operate. The **historic context** has created a set of conditions that make policy implementation difficult to change. There is a momentum for doing things in a certain way – a **historic precedence** has been set– which treats fishers and fish in certain ways. Likewise the **political economy** which underpins the fishery creates a covert mesh of motives and incentives which can reduce the transparency of what is being done and make changing it difficult.

The UK fishery is made up of a **complex mix of sub-sectors** which are represented in very different ways. Differences in vessel ownership, size, gear, crew and location all influence how fishers and fishing

communities affect and are affected by fisheries policies. It is often noted by NGOs that the small-scale inshore operators offer a more ready chance of collaboration than do the larger more industrialised fishing operations.

Fishers themselves operate in a world which is markedly different from most of us and that affects their behaviour. **Risk and uncertainty** are at the centre of their lives but the negative consequences can, to an extent, be offset in a well managed fishery where **high levels of profitability** can be achieved. But even still, entering the fishery is a costly business and many fishers risk loss of home, income and even life. Such **financial pressures** affect their **willingness and ability to comply** with the management regulation and that willingness is further challenged by the **lack of trust** between fishers and researcher and managers. This encourages them to circumvent the policy obstacles placed in their way. Even when they are not aiming to circumvent the restrictions the fishers still become more efficient through **technological creep and skill development**. For many people in the fishery, **dependency and vulnerability** are key features that keep them operating - they often have **few alternative employment opportunities** and there are **strong cultural bonds** which tie them into fishing. In spite of all these differences that make fishers unique they are still responsive to **public pressures** both from with the community and from outside, but these responses are tempered by a sense of injustice about some of the management measures imposed upon them, especially concerning discards. More and more they are also becoming subjects of market pressures and **certification** of fisheries is becoming an increasing part of the UK fishery.

In spite of, and in many cases because of, these contextual factors policies have had socio-economic impacts on the fishery. The UK fleet has undergone significant structural change in the last 50 years but not enough to bring catching capacity in line with fishing opportunities. There is still **too much fishing effort** and as a consequence much of the fleet has been faced with **declining profitability**. If the cost of subsidies to the sector were to be recovered from the fishers then few vessels would be profitable. The most significant indicator of socio-economic change has been **declining employment**. There are only some 12,700 people employed in the harvesting sub-sector now compared with nearly four times this in the 1930s. Given that most fishers are paid on a catch share after expenses then many of them must be experiencing **low incomes** and this is affecting recruitment to the sector. This is also affecting the **structure and operation of fishing communities**. For small highly dependent communities the loss of the fishery can mean serious effects on the local economy. Some communities are adapting and evolving – others are becoming more fragile. Fishermen themselves are having to adapt as well and this sometimes means taking more risks to survive. In spite of efforts to improve safety at sea, **mortality rates in fisheries** remain more than 50 times the average rate for the UK workforce.

Assessing which specific management measures have been responsible for change is difficult when so many interact with each other and the broader context of the sector. **Structural policy** seems to have helped the fishery to renew itself but at the expense of the fish stocks. The **extension of national jurisdiction** to 200nm has done more for nationalising over-exploitation than reducing it. **Subsidies** have allowed fishers to keep operating in a declining industry but they have also enabled over-capacity to dissipate resource rents to the point where many parts of the fishery are not even making normal profits. **Technical measures** can generate benefits for the fish stocks but not without significant hardship to the fishers in the short-term. **Marine protected areas** seem to benefit the resources and should also benefit the fishery in the long-term but they will affect different sections of the fleet in different ways. For

example, static-gear fishers may benefit while mobile-gear fishers may lose out – in the short-term at least. **Certification schemes** have not been running long enough to be fully assessed in terms of their benefits. Positive results have been quoted by the Marine Stewardship Council (MSC) but questions remain about the extent that these schemes incentivise improved environmental practices, their applicability to mixed species fisheries and their impact on developing countries. In the current economic climate it seems unlikely that enough people will be willing to pay extra for the label but benefits may come from more selective purchasing strategies by retailers. **Wider society** seems increasingly keen to purchase fish especially as the price has increased more slowly than other protein sources reflecting the large percentage of fish that is now imported into the UK. How people will react in the long-term to certification of sustainable fisheries is unclear but uncertainty over labelling and ethical purchasing codes is not helping the situation.

The impacts on the **political sphere** will change as the Lisbon Treaty starts to take effect and the governance structures change. There is also a growing emphasis on sustainable development from higher policy levels which might start to impact upon fisheries as climate change starts to affect budgets, targets and staffing. This in turn will feedback in the policy making process and possibly to a more effective round of policies, implementation plans and responses in the future.

.

3. INTRODUCTION

In 2008, the Tubney Charitable Trust commissioned a Sectoral Review of UK NGOs working to achieve benefits for marine biodiversity. The study recognised that there was a wide array of data on socio-economic issues in the fisheries sector but that this was not being used very effectively in the cause of marine biodiversity conservation. These data are often widely disbursed, in unusable forms, not converted into knowledge and largely ignored in what has become an increasingly hostile debate around balancing social, economic and environmental objectives for fisheries use, management and conservation. There are also believed to be significant gaps in that knowledge which hinder its wider application.

The better application of existing and new socio-economic knowledge has the potential to inform the debate around fisheries and marine biodiversity in ways that can help to achieve greater balance of conflicting concerns, and that leaves a viable and sustainable fishery operating in biologically diverse seas. This improved application of socio-economic knowledge can help NGOs to perform their roles more effectively whether they play an adversarial role, or one which works in partnership with the fishing community to achieve fair and sustainable outcomes, one which informs and influences government and intergovernmental agencies on policy or management issues.

The Trust seeks to help the NGOs to achieve this better understanding and use of knowledge of the socio-economic impacts of fisheries management and policy designed to achieve biodiversity conservation. In support of this aim the Trust contracted IMM Ltd to implement a study which included the following tasks:

- To carry out a basic review of current knowledge of the socio-economic impacts of fisheries management and policy designed to achieve biodiversity conservation (taken to mean the restoration of biodiversity, not just the maintenance of current levels).
- To assess the applicability and usefulness of the current knowledge to NGOs seeking to achieve biodiversity benefit in UK waters.
- To identify and prioritise further research needs and opportunities to develop models of sustainable fisheries delivering biodiversity benefits appropriate within the context of UK waters.

This report addresses the first of these three tasks. The audience of the Review is both the Trust and the NGO sector. It aims to discuss how socio-economic information and knowledge relate to the marine biodiversity debate around fishing, what kinds of information and knowledge exist, and where it can be found. The report starts with an outline of a framework which has been developed to link sources, types and uses of socio-economic information and knowledge together. This framework is used to give structure to that knowledge and to show how the different parts are essential elements of a whole. It then outlines why socio-economic knowledge is important to the fisheries/marine biodiversity debate. The majority of the report then describes what the key sources of socio-economic information and knowledge are related to each part of the framework and how they help to understand the complexities of responding to the current fisheries situation.

This report provides an outline synthesis of the literature that describes the socio-economic context of the UK marine fisheries industry. However, the fishery is complex and dynamic, and so people's current day-to-day experiences of the industry may change quickly. For example, there is very little literature to say how fisheries have been affected by the 2009/2010 economic downturn; the current work to implement the 2009 Marine and Coastal Access Act; or the influence of migrant labour on fisheries operations and communities.

4. THE IMPORTANCE AND DIVERSITY OF SOCIO-ECONOMIC KNOWLEDGE

A fishery is a complex system which links individual human endeavour, enterprise, risk, culture, the physical world, technology, the natural world, the political economy and wider society's beliefs, aspirations and values. In our attempts to understand and interact with fisheries we have often tried to simplify this complexity, to break it down and to work with its separate parts. Focussing on specific components of fisheries, such as gear/vessel classification and the over-simplification of relationships implicit in bio-economic models, are examples of this response. As the crisis in world fisheries deepens, so the pressure to find workable solutions increases. The combination of complexity and urgency has created a market for quick and technical solutions to management problems (Degnbol *et al.*, 2006). But these rarely do more than explain part of what is happening in localised situations at a given time. As Dengbol *et al.* explain, these "fixes" often lead to tunnel vision.

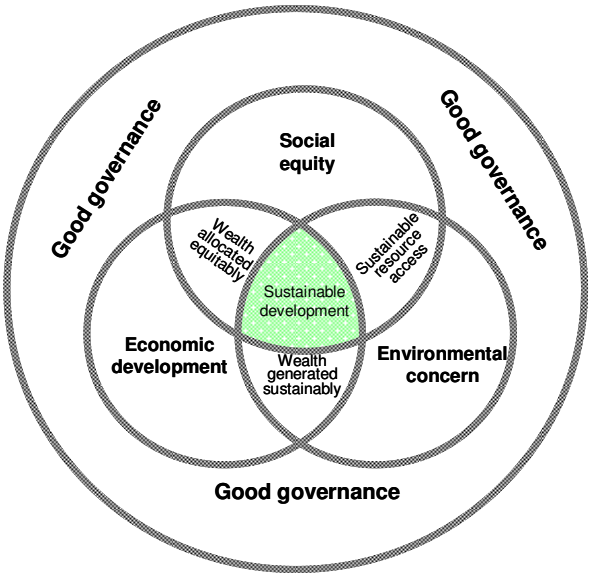
The current debate on fisheries and marine biodiversity has polarised to an extent around three key areas: 1) economic rationalisation, 2) marine conservation, and 3) distributional/equity issues. Each of these areas has predominantly emerged from specific disciplines each of which operates within a specific ***discourse*** i.e. a shared way of apprehending the world which constructs meaning and relationships, creates and uses its own language, validates knowledge in its own way, helps to define common sense and legitimate knowledge, and builds assumptions, judgements and contentions that provide the basis for analysis and debate (Dryzek, 2005). Such discourses tend to separate and isolate parts of the debate from other parts which then tend towards reductionism in the solutions they provide and to heightened disagreement between different discourses. Compartmentalisation of the fisheries/biodiversity debate around the three keys areas mentioned above has often been characterised by oversimplified solutions to fisheries problems such as the use of individual transferable quotas (ITQs), marine protected areas and community-based management (Degnbol *et al.,*2006).

This creation of separate realities around different disciplines and groups is the substance of *social constructivism*. Different groups with different perceptions of reality are likely to find different solutions to the same problems and fight forcefully to defend their conclusions. This helps to polarise debates and reduce the chances of negotiated solutions. As we become more knowledgeable we tend to become more specialised, but as Salz, Haefnagel and Vale (2007) point out, the management of fisheries requires a greater focus, not on reductionist approaches, but on ones which are more holistic and multidisciplinary in their nature.

The majority of UK-based NGOs involved in the fisheries/biodiversity debate have their greatest strengths in biological/ecosystem conservation knowledge. They have grown from that discourse and define their concerns, aspirations and solutions by it. When they engage with fishers or with politicians they engage with different discourses which are concerned, in part, with the intended and actual socio-economic impacts of change and the socio-economic context which shapes behaviour and attitudinal responses to such changes. To be really effective in that engagement NGOs need to be aware of, and understand the importance of, the socio-economic factors which define and shape the debate. It is a widely held belief by fishers that they are rarely valued for the experience and information that they have

and that their exclusion from meaningful engagement with the debate around solutions to current problems facing the sector is likely to make the resolution of those problems very difficult (Curtis *et al.,* 2009). McGoodwin (1990) notes that "*At the most fundamental level …fisheries are a human phenomenon…*" and trying to address that "humanness" without addressing socio-economic concerns and considerations is not possible.

Figure 1: Towards a new discourse of Sustainable Development



This has major significance for NGOs working to achieve positive outcomes for marine biodiversity. It becomes even more significant when we consider that fisheries in the UK operate within a European context, both in terms of where policy is made and in terms of a mixture of nationalities operating in UK waters. Across Europe the different cultural value systems alone make the commitment to, and application of, policy and law extremely variable. As a result predicting the behaviour of fishers of mixed nationality to a change in policy, law or other incentive is extremely difficult.

It is less important whether NGOs are working in an adversarial or collaborative way with the fisheries sector **but it is important that they work in an informed way**. The complexity of the socio-economic and cultural framework which informs and influences the decision-making of, and around, fishers should be understood and taken into account in developing NGO strategies. The required change of attitude and knowledge of NGOs to more effectively engage in this debate also requires a repositioning of the discourse in which their argument is based. This repositioning is also true of scientists, fishers and politicians. The gulf which exists between the discourses used today is so large as to render much of the debate useless. This has been recognised for some years at the global level where the debate has been raised from the sub-sectoral to the level of **sustainable development (see figure 1)**. This represents a paradigm shift towards developing a unifying long-term objective and a common discourse which combines not only environmental, social and economic concepts and perspectives but also those of governance. This quest for sustainable development offers opportunities for raising the level of debate around the UK fishery but requires a greater willingness of the parties to engage with each other's discourses and to expand the common ground. An increased internalisation and use of socio-economic information and knowledge by NGOs would be a valuable step towards that.

5. A FRAMEWORK FOR UNDERSTANDING SOCIO-ECONOMIC KNOWLEDGE IN THE CONTEXT OF FISHERIES AND MARINE BIODIVERSITY

In designing this study a conceptual framework was developed to enable the ideas, processes and linkages concerned with fisheries management, policy and socio-economic impacts to be better understood and to be visually presented (See Figure 2). This framework includes only those elements that are immediately concerned with the socio-economic impacts of fisheries management and policy designed to achieve biodiversity conservation. It also tries to open up that seemingly simple relationship into one which indicates the actual process which takes place between policy and impact in order that we might better see the complexities and linkages of that process, and progressively influence them.

The framework is described below together with a review of how NGOs may benefit from increasing their understanding of each component.

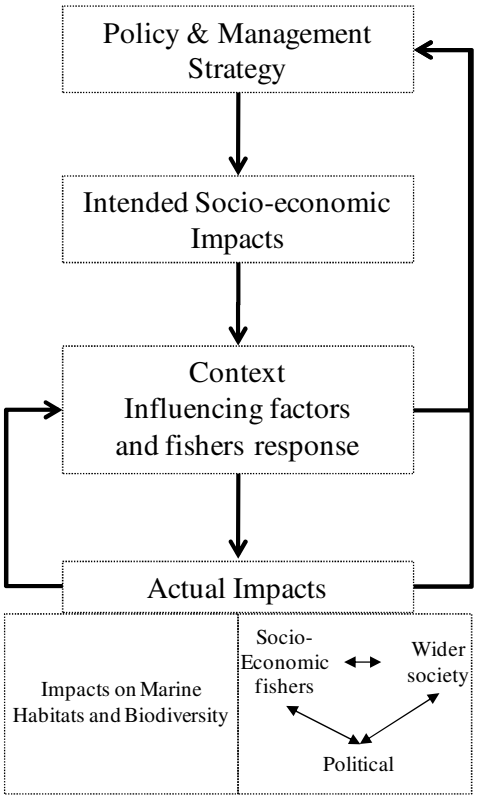


Figure 2: Framework for Analysis

Policy and Management Strategies

Fisheries management and marine conservation policies are set at different levels (local to global) and are designed to achieve a wide diversity of outcomes, both for the fishing industry, wider society and the marine environment. The policies are translated into reality through the different interpretations, strategies and resources that are allocated to implement them.

Importance For NGOs

Understanding the current policies, the context that they have been developed in and the processes that have been used to develop them is key to appreciating some of the drivers of behaviour of the fishing industry. Understanding policy processes can help NGOs to identify when and how to engage and how to best influence the final decisions. Likewise, understanding policy choices and being able to offer alternative solutions is more likely to influence change in a constructive way.

Intended Socio-Economic Impacts

The intended impacts provide an insight into the way decision-makers try to understand and perhaps predict the likely response to the policy and strategies that have been put in place. However, the multitude

of policy aims and measures and the lack of priorities and clear targets combine to create a rather muddled operating environment. This is particularly so where the stated aims of policies differ from the actual concerns of the policy makers.

Importance for NGOs

Understanding the planned for, or intended, socio-economic impacts on the key user group (fishers) is a critical part of understanding both the motives of the managers and policy-makers, and how these impacts of the policy and strategy may be affected by the response of the fishers. It is also important to understand the relative priority placed on these intended impacts by the policy makers and how conflicts between potential impacts are to be resolved. Where intended impacts are clearly stated it provides NGOs with targets to hold policy makers to account.

Context, Influencing Factors and Fishers' Responses

The socio-economic factors that make up the environment that surrounds how politicians develop policies, how policies are implemented and how fishers respond, are many and their influence can completely distort the way in which intended impacts actually materialise. For example, the balance of public opinion and their demands with respect to the well-being of fishers and the health of the marine environment is critical in influencing the type and strengths of policies and management strategies and the market incentives for sustainable fisheries. For the fishers, the financial concerns of running a business, the belief they have in the management system and the data used, the culture of the communities in which they live and what the public think of them, are all important influences.

The historic context in which fisheries processes developed (however outdated it may now be) still shapes many of the assumptions that form the basis for fisheries policy and management debates.

Importance for NGOs

Understanding and influencing this environment can be key for NGOs in their work to influence fisheries management and to develop effective partnerships with industry. At the policy level, understanding how fishers are responding to policy measures and feeding this back to policy makers, law makers, enforcers or the public can help to make policies and strategies work better or help to fix those that don't work at all. Likewise, understanding the incentives, behind the decisions made by politicians and fishers, can help NGOs to more effectively work in partnership with them or influence their behaviour.

Actual Socio-economic Impacts

The actual impacts are an outcome of intent interacting with responses. These impacts can be on the wider economy, fleet structure, profitability, employment, community cohesion and recruitment into the sector. They can also affect the way the general public and politicians see the sector and respond to it.

Importance to NGOs

The efforts to work towards improved fisheries management will be greatly enhanced where there is a widespread agreement that change is required. Calculating the costs of poor fisheries management compared with the potential benefits of improved fisheries management can be a powerful tool in the process of building consensus that change is needed. Likewise, where fishers and policy makers see the problems that they are facing as intractable their enthusiasm to deal with them is likely to be reduced. Providing examples of best practice and positive experiences can show people that change is both possible and may be beneficial. Highlighting the differences between the actual impacts of policy measures and the intended impacts is a useful approach for showing where improved efforts are required.

6. A BASIC REVIEW OF KNOWLEDGE OF THE SOCIO-ECONOMIC IMPACTS OF FISHERIES MANAGEMENT AND POLICY DESIGNED TO ACHIEVE BIODIVERSITY CONSERVATION

This section provides a review of the key sources of information and knowledge which address socio-economic issues, concerns and impacts associated with fisheries policies and management strategies aimed at conservation objectives.

The importance of socio-economic knowledge to the development and application of the Common Fisheries Policy (CFP) was recently recognised by the European Commission. To overcome the shortage in social research in the fisheries sector, the Commission funded an initiative over a three year period, to establish the European Social Science Fisheries Network (ESSFiN) to provide a focus for the social sciences.

It also funded a research project called Marifish. An output from this work was a report entitled "State of the Art of European Fisheries Research in Economics and other Social Sciences" (Salz, Hoefnagel and Vale, 2007) which summarised the then status of research in economics and other social sciences regarding fisheries and assessed the strength of the existing research infrastructure in this area in Europe. Some 800 research papers and reports were documented and placed in a database (http://www3.lei.wur.nl/marifish/Home.aspx). This current review draws on the Marifish review and database but also builds on it and applies it from the perspective of what might be useful to NGOs in engaging more effectively with the fisheries/marine biodiversity debate. Some 200 documents were studied during the current work. The literature was generated from existing libraries, internet searches and from cited references.

The socio-economic information and knowledge is discussed in sub-sections that broadly reflect the framework outlined above but, of necessity, many of the documents cut across sections.

This section of the report reviews the current status of the knowledge of socio-economic impacts of fisheries management and policy. This is broken down into four broad sub-sections:

- Policy and management strategies
- Intended socio-economic impacts
- Context, influencing factors and fishers' responses
- Actual socio-economic impacts

Each section reviews the relevant literature and the associated knowledge which that provides.

Policy and Management Strategies

Introduction

The social and economic impacts, intended and actual, of fisheries management policies and strategies need to be discussed within the context of a wide diversity of policies and policy processes. These policies are made at different levels (from local to global) and set out to achieve many different objectives (from economic to environmental). This complex policy environment shapes the actual socio-economic outcomes of the fisheries sector which have in turn influenced the way the sector has impacted upon marine biodiversity.

This section looks firstly at the different levels (international, regional and national) of fisheries policies and the many different objectives that emerge. The relationships between UK fisheries policy and EU fisheries policy are described and the section concludes with a discussion of the specific policy instruments that are used to bring about impact in the fishery.

Policy Complexity

A key characteristic of the policy process around fisheries globally, within Europe and in the UK, has been the complexity of aims and objectives and the conflicts between strategies to achieve them.

The Food and Agriculture Organisation (FAO) of the United Nations has global responsibility for the development and management of fisheries in line with its mandate of achieving food security for all. The ambiguity of its mandate, one of balancing production increases with sustainability and equity – implicit in the phrase 'security for all' - reflects a wider confusion in policy which the world of fisheries has tried to deal with for many years. The perceived need to develop fisheries and to increase fish production to feed the global population has led to an emphasis on increasing efficiency of productive capacity and the globalisation of markets. But the pressure for economic efficiency has conflicted with conservation and the equitable distribution of benefits. This has led to a confused policy environment marked by policy trade-offs and ultimately compromised the success of policy.

Within Europe, the CFP offered an opportunity to provide a framework for the management of the fisheries sector but a confused and conflicting policy framework seemed to hinder it from the start. Laxe (2009) reviews the aims and impacts of some areas of CFP policy. He notes that by 1983 the CFP aims were as follows: a) management of resources based on conservation and sustainable exploitation of resources; b) structural policy geared towards the optimisation of the sector's fixed assets and the adaptation of fishing structures to actual possibilities; c) commercial policy focussed on the creation of internal commercial structures; and d) the policy of exchange moved towards common provision by means of products coming from third countries. Laxe (2009) also notes that in later years other objectives were identified including: to guarantee the continuity of fishing activities; to guarantee stable provision; to guarantee reasonable prices for consumers; to contribute to the realisation of domestic markets; and to favour economic social cohesion. There can be little surprise that this diversity of, often conflicting, aims led to a low success rate. In addition to a confusion of polices within the sector, Laxe (2009) also noted that there was little coherence with wider EU policies. The Commission's own Green Paper on the review of the CFP (EC, 2009) identifies a number of causes of failure: fleet over-capacity, imprecise policy objectives, the prevalence of short-term objectives, lack of devolved responsibility to industry and

a lack of political will to ensure compliance. The current and continued use of the Total Allowable Catch (TAC) as a basis for management of a mixed fisheries has also been called into question (Schwach *et al.,* 2007; Daan, 1997).

Hilborn (2007) tries to make sense of these complexities of fisheries management and to break them down into manageable forms. In so doing he also casts light on the motives and intended outcomes of different groups of stakeholders involved in the management process. He concludes that there are broadly four categories of fisheries objectives: biological, economic, social and political. He suggests that biological objectives are concerned with maximizing production which translates in the traditional maximum sustainable yield (MSY). Economic objectives, however, are concerned with resource rent maximization through efficiency i.e. maximum economic yield (MEY). Whereas social objectives are concerned with distributional issues of employment, income, maintenance of communities and food security – what Hilborn refers to as maximum job yield (MJY). He goes on to describe political objectives as primarily the avoidance of conflict which has prompted the use of the term minimum sustainable whinge (MSW).

Hilborn suggests that the current fisheries crisis can be thought of largely as a conflict of these different objectives. He links these policy objectives to different stakeholder groups in a way that clearly differentiates the groups from each other. Large-scale fishers may want a greater focus on economic optimization or maximum production (depending on the management regime in place) whereas small-scale fishers may want stable, reliable yields. Fisheries managers operate within a highly politicized context and often balance objectives through MSW, likewise politicians often react to policy by providing appeasement measures, such as subsidies, to reduce conflict. Hilborn suggests that government scientists tend to err on the side of caution and avoid deciding where they stand in favour of collecting more data. Environmental NGOs tend to focus on ecosystem and species health and the negative impacts of fishing, which tend to conflict directly with those of production maximization. Hilborn suggests that the conflicts over who should make fisheries management decisions is simply a question of how much weight should be given to the objectives of these different stakeholders.

This gives some idea of the drivers behind the complexity of objectives and even of the different ways that different groups have of looking at the fishery. It also gives some indication of why there is so little agreement on targets for the achievement of management objectives – if the different groups are talking at cross-purposes they are unlikely to ever achieve a consensus on what is needed.

But do any clear targets emerge for socio-economic objectives? Earll and Gubbay (2006) explore the interactions between socio-economic and ecological objectives relevant to the UK seas based on an analysis of high level policy statements. They found that no single document was available that describes these socio-economic objectives and for many sectors there was not a clear link between socio-economic objectives and their ecosystem counterpart. For the fisheries sector they found that the UK government's policy was set out in rather general terms with no specific targets. Looking more specifically at the content of policy, Symes and Phillipson (2009) say that *"…in Europe, North America and Australasia the social objectives of fisheries policy have all but disappeared from view."* They go on to explain that much of the policy has been focused on economic objectives with a "trickle down" approach to address the social issues running parallel with social welfare schemes. They suggest that the shift in governance from

national to EU levels has led to social objectives falling between the gaps in a very complex governance framework. This has led to social objectives being downgraded and made increasingly opaque.

In addition to the mix of global, CFP and national policy aims and objectives, the EU has developed a maritime policy (EC, 2006) which tries to unite the different policy areas associated with the sea. This recognises the confusion of policy objectives and starts to suggest a greater focus on sustainable use of the marine environment as a priority to ensure the long-term socio-economic benefits. It also looks at issues of governance. In addition, the EU has various structural and cohesion policies which have influenced where subsidies and other support are directed. Many fishing communities have benefitted from these because of the communities' peripheral nature.

Fisheries policy in the EU is continuously evolving and Symes and Hoefnagel (2009) suggest that the CFP 2002 reforms have started a series of shifts in the policy focus:

- From a tactical to a strategic approach;
- Frome predictive to adaptive management;
- From a single species approach to a more sophisticated ecosystem-based approach to management;
- From top-down, 'command and control' micromanagement of fisheries to handing initiatives to the industry to assume more responsibility for shaping the detailed design of fisheries management.

More generally Jentoft (2006) sees fisheries management moving more towards fisheries governance and this is accompanied by three dimensional changes:

- A growing appreciation of the social and political aspects of fisheries –concerned with social values, interests and power, and the participation of stakeholders;
- A growing recognition of the need to look outside of fisheries for the solution of fisheries problems;
- A move towards disciplinary inclusion where the hegemony of the natural sciences should be replaced by multi-disciplinary and preferable inter-disciplinary approaches.

This complexity of aims of policy in fisheries confuses our understanding of both motives and intended outcomes. The lack of priority between competing aims and the lack of precise targets for many aims means that measuring the social and economic impacts, intended and actual, is difficult at best. Likewise, mixed objectives and associated policy measures are likely to interfere and, in some cases, cancel out their respective effects and impacts. An additional level of complexity is now emerging as the focus of policy and the mechanisms for decision-making are shifting.

This lack of clarity is closely linked to the complexities of the policy process.

The Policy Process

The decision-making process around UK fisheries is largely determined by the procedures established by the CFP and the EU more generally. The European Commission (EC) has primary responsibility for initiating proposals for legislation whilst the Council of Ministers (Ministers from national governments)

is the main decision-making body. This means that decisions at this level are essentially political. Whilst technical bodies such as the Advisory Committee on Fishery Management (ACFM) and the Scientific, Technical and Economic Committee for Fisheries (STEFC) propose policy measure (such as TACs) based on the best available data, the decisions on what finally becomes policy is made by the Council. The administrations in the member states are then charged with the responsibility of implementing these decisions at the national level. This can be broadly regarded as a two-tier systems with some decisions being made at the EU levels and some at the national level (although there are also decisions made at the Producer Organisation and inshore fisheries levels but these tend to be tactical rather than strategic). The 0-12nm zone in each country remains largely under national jurisdiction.

The benefits and difficulties of this two-tier system are discussed widely. Gezelius and Raakjaer (2008) have implemented a comparative study of three neighbouring states: Norway, the Faeroes and Denmark. This is summarised and critiqued in Symes (2009) who highlights the failure of the two-tier political systems to ensure compliance with resource conservation measures. This failure is attributed to "implementation drift" where political decisions made in Brussels are redefined and alternative political agendas[1] pursued at member state level. The European Commission's Green Paper on the review of the CFP (EC, 2009) proposes even greater devolution of responsibilities to regional bodies and this is discussed by Symes (2009) in some detail. Whatever the emerging management trends and changes it is likely that "one size will not fit all" as Nielsen and Christensen (2004) conclude for the Danish fishery.

Policy Instruments

Whilst the CFP is essentially a centralising process some aspects of the decision-making have been devolved to lower levels. Member States have been provided with the responsibility for developing and implementing technical and other management measures which could be directed at managing their respective fleets. Many different policy instruments are used.

Total allowable catches (TACs) are established at the Community Level for different stocks and member-state fleets. The EU also applied a structural policy, which was generally about the fleet development; market policy, to establish standards, stabilise prices and incomes, and consider consumer interest; external fisheries policy, to maintain fish supplies to Europe and to provide alternative fishing opportunities to EU fleets; and conservation policy.

TACs are based on the scientific findings of the various research institutes across the EU, especially ICES. But as Symes and Hoefnagel (2009) point out "*..the CFP's reputation as a science led policy may be rather less secure. There are doubts about the accuracy of landing data used in stock assessments, questions over the robustness of standards set for recovery of stocks and concerns that the outcomes of the policy process commonly fall well short of the levels recommended in scientific advice from ICES."* TACs have invariably been established at levels higher than the levels recommended by the scientific community and stocks have progressively become more endangered over time. As Holden (1994 p. 70) notes: "*It is not surprising that the level of TACs is mainly determined by political decision because*

[1] The alternative political agenda referred to by Symes (2009) at the national level is, in part, a component of the process referred to as the political economy and are discussed in more detail in the sub-section dealing with context.

politicians regard it as their responsibility to respond to the pressures from the fishing industries as they consider fit. That is democracy in action. Account is taken of scientific advice but more often than not it has been disregarded for socioeconomic reasons, which is little more that coded language for saying 'avoided political unpopularity'."

National governments are then engaged in using a variety policy instruments such as subsidies, licences, quotas, minimum landing sizes of fish, gear restrictions, time at sea restrictions, area restrictions and stock restrictions. Holden (1994) describes the early evolution of these measures. Subsidies have been used in a number of ways including providing research, management and enforcement capacity, fisheries infrastructure, tax exemption, decommissioning of vessels, access to other country's waters, and income support and insurance (Munro and Sumaila, 2002). Restrictive licensing schemes limit the number of boats allowed access to the fishery. Quotas have been a key part of the CFP and divide TACs up amongst the different vessels or producer organisations. Emphasis has also been placed on improving gear to reduce discards and the capture of both under-size fish and non-target species. Reducing the number of days that fishers can spend at sea is aimed at reducing overall fishing effort. Area restrictions have been used to protect fish at particularly vulnerable stages in their life histories or to protect particularly important habitats such as through marine protected areas. Area restrictions have also been used to restrict access by certain vessels and for marine spatial planning. Stock restrictions target particular species and aim to protect them from over-exploitation.

Summary And Conclusions

The policy framework that shapes UK fisheries has given rise to a very complex policy environment where policies conflict and sometimes even cancel each other out. That confused environment can also enable policy makers to avoid having to make unpopular decisions or make some that will not have any adverse impacts simply because they will be ineffective. In addition, the two tiered policy process provides the latitude for implementation drift to occur. Understanding how decisions are made within the EU and the UK can help clarify why this complexity exists and why so many different policy instruments have developed.

Some of the key findings from this review include:

i. Policy conflicts across specific policy areas confuse the intent of policies;

ii. UK fisheries policy and management can only be analysed in the context of EU fisheries policy and management. Decisions at the EU level need to be grounded in action within the member states;

iii. Implementation drift at the national level creates enough latitude for most people to find what they want to in the policy documents of the national administrations;

iv. An analysis of policy implementation in the UK suggests that the priority of the policy-makers has been maximising the short-term gains to the fishing industry but all too often at the expense of the long-term sustainability of the resource;

v. The importance of minimising political turbulence (or achieving a point of "minimum sustainable whinge") seems to be a key factor in political decision making.

Intended Socio-Economic Impacts

Introduction

As discussed in the previous section, the objectives of fisheries development at the EU and national levels are complex but within the complexity there are some indications that socio-economic impacts were and are intended. This section reviews the key documents that outline or discuss the intended socio-economic impacts at the EU and national levels.

Intended Impacts Of The CFP

To say that the CFP as first formulated had a clear set of intended impacts as indicators of its policies would be to attribute it with a level of detail and vision which did not exist. Even in subsequent reforms of the policy objectives were vague, not prioritised and imprecise. Symes (1998) says of the aims of the revised CFP from 1992 that *"Students of semantics may read into this statement* (of the aims of the reformed CFP) *different levels of priority attributed to the safeguarding of resources, the fishing industry, consumer interests and marine environment. In effect, there is no clear prioritisation of objectives but, to judge from the outcomes of the CFP, the sustainability of the fishing industry is seen to be the de facto priority, while concern for the marine ecosystems has been set aside."* This reflects, and is reflected in, the political nature of the decision-making by the Council of Ministers and their efforts to address the short-term needs of the industry at the expense of its long-term viability.

Churchill (1987) describes the original intentions of the CFP. These were laid out in the EEC Treaty and dealt specifically with agriculture which included fisheries. These were:

- To increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour;
- Thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;
- To stabilise markets;
- To assure the availability of supplies;
- To ensure that supplies reach consumers at reasonable prices.

The language of these objectives is so vague as to introduce a wide array of possible intended outcomes for the fisheries sector as Churchill describes. But as discussed in the previous section, this gradually evolved into more concrete aims under different policy areas. These four key policy areas are discussed below.

Intended impacts of the structural policy

In Regulation No. 101/76 the objective of the CFP structural policy was to promote harmonious and balanced development of the industry within the general economy and to encourage rational use of the biological resources of the sea and of inland waters. These were described in more detail in Regulation No. 4028/86 and concerned:

- The renewal and modernisation of the fleet;
- The development of aquaculture;
- The use of protected marine areas to support improved management of inshore fisheries;
- The identification of new fishing opportunities;
- Fleet capacity reduction;
- Improved fish landing facilities;
- Market development.

The intended impacts of these aims concerned more effective, efficient and safer fishing vessels and increased livelihood opportunities for fishing communities through aquaculture diversification. Improved catch rates were supported through better management of existing resources and through the location of new stocks. Reduced competition for fishing opportunities was supported through fleet reduction and improved incomes for producers were encouraged through better landing facilities and better market access. Clearly these policies were intended to improve the incomes, sustainability and safety of the livelihoods of fishers. Holden (1994) describes these measures and their success in some detail.

Intended impacts of the market policy

Regulation 2142/70 describes the market policy aims as:

- To establish market standards;
- To stabilise market process and avoid surpluses;
- To help support producers' incomes;
- To consider consumers interests.

This was clearly intended to improve the quality of fish available to consumers and to ensure that fish were available at reasonable prices. They were also designed to ensure price stability for fishers through financial compensation measures.

Intended impacts of the external policy

The external fisheries policy was concerned with creating fishing opportunities for the EU fleet through agreements with third countries. This was useful for the UK for three reasons:

- It took away fishing effort from France and Spain that could have competed directly with UK vessels;
- It opened up potential fishing opportunities for UK vessels in Faroe Islands, Greenland, Norway and Sweden;
- It increased supplies of fish to UK processors, retailers and consumers.

Again this policy was were clearly intended to increase fishing opportunities for UK fishers and to help processors, traders and consumers – although increased supplies of fish on the UK market may have also been designed to maintain prices paid to producers at lower levels as well.

Intended impacts of the conservation policy

The CFP aims for conservation are outlined in Regulation No 2141/70 which provides for access rights, TACs and associated technical measures. The equal access rights of all EU members at the time, to UK waters, was seen as a major threat to UK fishers' fishing opportunities. The use of TACs for different stocks of fish and the allocation of national quotas was also of major concern and many felt that the fishing opportunities available to the UK fishers would be reduced. A variety of adjustments were made to these national quotas (relative stability, historic catch allowances and Hague Preferences) that are described in detail by Holden (1994). At least some of these, along with the exclusion of the six mile limits, were designed to address the issues of dependent communities in the fishery.

The technical measures designed to manage the fishery at the national level were listed in the previous section. Symes (1998) broadly classifies the intended effects of these as:

- Those designed to restrain the growth of fishing effort ;
- Those intended to limit output – i.e. the quantity, size, reproductive condition and species of fish;
- Those intended to improve the selectivity of fishing gear;
- Those designed to protect specific populations or sites.

These aim in the short-term to, in effect, limit catches by the fishing fleet and in the long-term restore stocks to a healthy level. However, political involvement in the setting of TACs has meant that greater emphasis has been placed on achieving short-term socio-economic objectives at the expense of long-term ones.

CFP Reforms

European Commission's Green Paper on the reform of the CFP in 2009 (EC, 2009) reviews the past aims and performance of the CFP. The main changes to the CFP occurred during the 2002 reform and included:

- Moving towards a longer-term perspective on fisheries management by introducing recovery and management plans;
- Increased commitment to ensure the integration of environmental concerns into fisheries management;
- Increased stakeholder involvement by establishing the Regional Advisory Councils (RACs);
- A new fleet policy, doing away with compulsory targets for capacity reduction and replacing them with national ceilings under which Member States are free to choose how they conduct their fleet policy;
- Introducing fishing effort, such as limiting the days a vessel can operate at sea, as a fundamental tool in fisheries management, notably in the context of multiannual recovery plans;
- A more selective use of public funds to support the development of the sector by discontinuing the use of public aid to construct new vessels, by a structural policy more coherent with CFP objectives and with more emphasis on diversification in coastal communities;
- New bilateral fisheries agreements aimed at developing partnerships with the third countries concerned.

These changes were done at a time when the World Summit on Sustainable Development was calling for the World's fish stocks to be returned to MSY by 2015.

These CFP reforms were, from a socio-economic perspective, aimed at ensuring the long-term survival of the fishery by being more strategic in its objectives and more closely linking fishing capacity to available opportunities; enhancing the role of fisheries in the decision-making process through RACs; increasing flexibility in fleet management to fit in more with local needs; removing fishing opportunities through days-at-sea controls; shifting the responsibility of fleet renewal onto the private sector; supporting coastal livelihood diversification and continuing to seek increased fishing opportunities in third countries.

According to EC (2009) these reforms have generally failed either to return the stocks to MSY (88% of Community stocks are fished beyond MSY) or to achieve an economically viable fleet. Chronic over-capacity of the fleet and declining fishing opportunities have not helped the social and economic conditions of fishers except where political pressure has provided short-term benefits at the cost of long-term sustainability through allowing unsustainable fishing pressure and offsetting industry costs through large-scale subsidies (for instance for fuel). The Commission states that it has been estimated that, in some member states, the cost of subsidy exceeds the total value of the catch.

According to EC (2009) the future reforms of the CFP are likely to use market forces rather than structural policy to reduce excess capacity whilst recognising the dependency of some coastal communities on the resource – this could mean the development of separate large-scale and small-scale fisheries management systems. It is likely to try to have a greater degree of prioritisation of objectives with those concerned with sustainability of the stocks and adopting an ecosystem approach being considered of higher priority in order to be coherent with other EU policies (especially the Integrated Maritime Policy) and as a prerequisite for achieving an economically viable and sustainable fishing industry. Greater responsibility is likely to be given to the industry for managing the fishery and for their greater participation in decision-making. At the same time there will be pressure for greater cost sharing and for the industry to begin to pay for the right to fish. It is also likely that, in the short-term, employment and incomes will take second place to rebuilding fish stocks. From the processor, retailer and consumer perspectives the pressure to reduce discards is likely to result in more fish being landed and a wider diversity of species being available.

UK Government Measures

Whilst the broad policy framework for fisheries management and development is set at the EU level the instruments for policy implementation are the responsibility of the member state. The UK government has played a significant role in ensuring that the social and economic conditions surrounding the fishery are maintained at acceptable (to the industry) levels. In March 2004 the Prime Minister's Strategy Unit published its report, **Net Benefits: a sustainable and profitable future for UK fishing**. This proposed a possible long-term strategy for improving the fortunes of the fishing industry and the communities that depend upon it.

Net Benefits addresses the social issues of the fishery in some detail both in its research and recommendations, as Symes and Philipson (2009) say it: *"appeared to offer real hope for the renaissance of social objectives in fisheries policy*." Whist **Net Benefits** was not a policy document it did go on to

influence policy and provided a window into the future thinking of government about the management of the fishery. The UK's Fisheries Administrations joint response to **Net Benefits** was called **Securing the Benefits** (DEFRA, 2005). This identified the aim of fisheries development to be: "*A fishing sector that is sustainable and profitable and supports strong local communities, managed effectively as an integral part of coherent policies for the marine environment*." The objectives needed to achieve this were defined as follows:

- To ensure that fisheries management within the UK is seen as an example of best practice;
- To secure the management of fish stocks as an important renewable resource, harvested to optimise long term economic returns;
- To ensure that stocks are fished at biologically sustainable levels and discards are minimised;
- To promote sustainable fisheries consistent with a diverse and resilient marine environment;
- To provide conditions in which the fishing industry is profitable in the long term, competitive in both global and local markets to the benefit of producers and consumers, without the need for operating aid;
- To promote high levels of confidence in the fishing industry that lead to long term investment in innovation and technology;
- To tackle social exclusion and promote long term prosperity in communities traditionally dependent on the fishing industry.

This aim and these objectives show some clear (if non-prioritised and without objectively verifiable targets) intended socio-economic impacts for the fisheries sector. These include a secure long-term investment climate, profitability and inclusion of peripheral dependent communities. They also suggest that the fishing industry will pay for the right to be involved in the fishery and for its management.

Symes and Phillipson (2009) discuss the role of **Net Benefits** in addressing social issues and of **Securing the Benefits** in responding to these. They say that **Securing the Benefits** *"…spurned suggestions for explicit social objectives."*

These aims are now subsumed by the High Level Marine Objectives outlined in **Our seas – a shared resource** (HM Gov., 2009). In October 2005 DEFRA published **Charting a New Course**, setting out how DEFRA, working with stakeholders, would deliver the policies in **Securing the Benefits**. The aims and objectives did not change from those expressed in **Securing the Benefits.**

Box 1: Modelling Outcomes

The Investinfish project in the South West of England was designed to return fish stocks in the Western Approaches, English Channel and Celtic Sea to sustainable levels. In the process a series of modelling initiatives were carried out to simulate the interactions between fish stocks, the size and effort of the fishing fleet and regional output and employment. The aim was to compare the effects of different policy options for the management of the regions' fisheries relative to the baseline of what was expected to happen if no action was taken.

The different options assessed included:

- 10% decommissioning of the UK fleet
- 20% decommissioning of the UK fleet
- 20% effort reduction by the EU fleet
- 20% effort reduction by the UK fleet
- Mesh size increases from 80mm to 90mm for UK beam trawlers
- Mesh size increases from 80mm to 100mm for UK beam trawlers
- Use of square mesh panels
- Inshore beaming displaced in Area VIIe

Source: www.investinfish.org

Government Measures - England

In October 2007 DEFRA published **Fisheries 2027** (DEFRA, 2007) which was a long-term vision for sustainable fisheries for England and within British Fisheries Limits adjacent to England. It was designed to guide future fisheries policy and provide direction for marine fisheries. **Fisheries 2027** contributes to the Government's vision of *clean, healthy, safe, productive and biologically diverse oceans and seas.* This document has seven vision areas and their achievements are predicted to produce a series of social and economic costs and benefits as outlined below:

Economic Benefits

- Good long-term economic prospects and more stability for those who access fisheries.
- Effective fisheries management, with a lighter touch from EU and Central Government, and good value for money for the taxpayer.
- Most businesses will be efficient, competitive and plan for the long term.
- Fishers will be able to make profits over the long-term despite variations in fish stocks in the short term.
- Value of landed fish will be maximised.
- Economic return from fisheries to society.

Economic Costs

- Not all fish will be harvested in the most economically efficient way.
- Environmentally damaging behaviour will incur a financial cost.
- Long-term environmental protection will be more important than short-term economic gain; there may therefore be short-term economic losses throughout the supply chain and to Government.
- Fishing techniques that cause damage to non-targeted species and habitats will carry economic cost proportionate to the damage caused.
- Some inefficient or environmentally irresponsible businesses may fail.

Social Benefits

- Society will gain value from fisheries including benefits such as thriving coastal towns and villages.
- Fishing communities will continue to gain benefits from fishing.
- Communities will diversify into non-fishing activities and will therefore be more resilient to changes in the abundance of fish.
- There will be local participation in decision-making.
- There will be a supply of locally caught fish for food.
- Commercial catchers will feel more secure about their future and more confident in the way that they are regulated.
- Consumers will understand the impacts of the choices that they make.
- Consumers will eat a wider range of fish.

- Recreational sea anglers will continue to enjoy their sport and the potential for growth will be realised.
- All members of society will enjoy the non-use benefits of the marine environment, including the value that people place on a healthy marine environment, abundant fish stocks and the protection of rare, vulnerable and valued species and habitats – even if they do not use the marine environment directly themselves.

Social Costs

- Access to most of the fisheries by the most economically efficient operators may mean that some benefits may be lost from traditional fishing communities.

Government Measures - Scotland

The situation in Scotland overlaps with that of England in many respects. The aims set out in **Securing the Benefits** were joint aims, shared across the four national administrations. The report **Seas the Opportunity - a strategy for the long term sustainability of Scotland's coasts and seas** was published in 2005. This endorsed the vision for "*clean, healthy, safe, productive and biologically diverse marine and coastal environments, managed to meet the long term needs of nature and people*"**.** The strategy set out an objective to "*develop better integrated, relevant scientific data on the marine environment and the effects of pressures on it*". The report **Scotland's Seas: Towards Understanding their State** is a part of that process and it is designed to assist with the current Scottish marine policy development. It provides a baseline of information and data sources that paves the way for a full **State of Scotland's Seas** report in 2010.

The Scottish Government's aim is to secure a vision of clean, healthy, safe, productive and biologically diverse marine and coastal environments, managed to meet the long term needs of nature and people.

Symes and Phillipson (2009) note that there is a major divergence in policy between England and Scotland in that England prefers to go down the route of formalising the existing ITQs for its fleet whilst the Scottish administration, concerned to limit further structural and geographical concentration, is unwilling to follow suit.

Government Measures - Wales

In 2008, the Welsh Assembly Government launched the **Wales Fisheries Strategy**, with a vision which aims to '*support the development of viable and sustainable fisheries in Wales as an integral part of coherent policies for safeguarding the environment'*.

In achieving this vision a number of goals applicable to all fisheries have been identified:

- Environment – fisheries developed and managed in a sustainable way contributing positively to environmental policies of Wales.
- Healthy fish stocks – development and management of fisheries at sustainable levels as a part of healthy and productive ecosystems.
- Positive community role – recognition of fisheries as a positive contribution to the communities of Wales.

- Economic contribution – maximising the economic importance and contribution of fisheries to the development of the 'Wales' brand on a Wales/UK/EU/International level.
- Partnership working – to further the partnership working already established between policy makers, stakeholders, and delivery agents for fisheries and establish this joint role as custodians for the future.

This does not directly address the social and economic conditions of the fishers but rather considers what the sector can do to support the wider economy and local communities. The text of the strategy goes on to say that the Wales Fisheries Strategy should meet the needs of the industry for optimised socio-economic benefit in a manner consistent with sustainable harvesting and cultivation. This is designed to also fit into the Assembly Government's Communities First programme, which aims to improve the living conditions and prospects for people in the most disadvantaged communities across Wales. Many fishing ports are within these areas. The strategy also places emphasis on promoting locally sourced food and building aquaculture in the region.

This broad strategy is developed through a **Wales Fisheries Strategy: Implementation Plan** which provides clear targets for each of the areas concerned.

Government Measures – Northern Ireland

In Northern Ireland the fisheries sector is covered by the Department of Agriculture and Rural Development Northern Ireland (DARDNI). The Fisheries Business Plan 2009/10 identifies a number of objectives which address the economic performance of the Marine Fishing Industry. This process will involve fleet restructuring to match current and projected fishing opportunities, enhancing stakeholder involvement, implementing days at sea arrangements, agreeing management plans, implementing effective enforcement activities, and implementing port inspection programmes.

Tingley (2006) was commissioned by DARDNI to develop models to explore future scenarios for the fishery with the aim of arriving at a likely range for the number of boats that could be economically sustainable in the long-run. This document reviews the past trends in the fishery, evaluates the strengths and weaknesses of the Prime Minister's Strategy Unit (SU) modelling at the UK level, proposes some modification to the model and arrives at a series of potential outcomes for the Northern Ireland fleet.

Summary and Conclusions

This section has dealt with the literature around the intended socio-economic impacts of policies and policy measures. The muddled policy environment often makes traceability of intent unclear, however, the CFP in its early stages did have policy areas with aims which were incrementally developed over time. The most comprehensive literature on these intended impacts is produced by the European Commission in its regulations, Green Papers and background documents.

At the UK and devolved administration level of policy implementation there are a number of key government documents which describe the intended outcomes but often in ways which leave enough unsaid to allow most sides of the social/environmental/economic debate to interpret intent in different ways.

Some of the key findings from this review include:

i. Marine biodiversity conservation is increasingly being recognised in policy documents;
ii. Predicting the impacts of policies is very challenging and different groups will interpret the potential impacts of different policies in different ways;
iii. The lack of prioritisation and the lack of clear targets make it difficult to see how competition between aims would be resolved.

Context, Influencing Factors and Fishers' Responses

Introduction

The historic evolution of the fishery and the forces at play within the political economy influence the way political decisions are made and the way fisheries managers at the national level have interpreted EU policy. The context in which those policy measures are converted into actions by the fishers is subject to a number of influencing factors that can change the course of those actions. Salas and Gaertner (2004) recognised this when they said: *"…fishers develop and implement strategies and tactics in response to the constraints they encounter and their intended objectives given their particular human, social, cultural and economic contexts. Managers in contrast, have generally made simplistic assumptions about fishers' nature and attitudes when defining management policies".* Hilborn (1985) cited in Salas and Gaertner (2004) suggests that the collapse of many fisheries is as a result of misunderstanding fishers' behaviour rather than a lack of knowledge of fisheries resources. Hilborn (2007) notes that "…*fishermen respond to regulation in ways that often surprised managers, and managers must understand the motivation and incentives for fishermen to understand how they respond."*

In this section these factors have been grouped in the following way:

- Historic context;
- Political economy;
- Risk and uncertainty;
- Profit margins;
- Financial pressures;
- Attitudes towards, and incentives for, compliance;
- Trust between fishers and management;
- Technology change;
- Remoteness, culture and perceptions of self;
- Influence of public perceptions on fishers and policy makers;
- Market pressures.

The Historic Context

The policy and management measures are driven by, and affect, the historic context of the sector. This context has influenced both policy makers and fishers. It is only in this historic context that the basis of policies and how they interact with responses of fishers can be understood.

An early Socio-economic Impact

Starkey, Reid and Ashcroft (eds), 2000, give a comprehensive account of the commercial sea fisheries of England and Wales since 1300 but this even extends back before that date noting that Billingsgate, built in 1016, in London was one of the oldest fish quays. Even in the seventeenth century fisheries was having a major impact on the socio-economic wellbeing of people. The demand for labour in the Dutch herring fleet was reported to have banished begging from the English streets. Fishing was also seen as a means of achieving colonial aspirations and the fishing, and more particularly, the land based processing of cod in Newfoundland caught from adjacent waters was instrumental in England's links North America. This is because English boats were competing with those of France and Portugal for available fish but the French and Portuguese boats had access to cheap salt and were able to dry their fish onboard. English fishers had to pay for expensive salt and thus used less and relied more on air drying which was land based – eventually they established permanent land settlements along the coast of Newfoundland.

Robinson (1996) describes the rise and fall of the British trawl industry and the associated technological developments whilst Thompson, Wailey and Lumis (1983) describes the impact of economic and technological change through the last one hundred years on the way of life of the people of the fishing industry. Other historic accounts of the fishing include Butcher (1979) which looks at the history of the driftermen who chased the herring, Butcher (1982) which looks more at the shore-based industries, and Butcher (1987) which studies the itinerant Scottish fisher girls, netmakers, curers, coopers and boatbuilders. These show the harshness of the living from the seas in the past and how government and philanthropists have sought to change those lives. MacGarvin and Jones (2000) give an historic summary for each of the main fishing areas of the UK.

The Beginnings of Policy

Fisheries management policy also has early beginnings (see Box 2). Cushing (1975) gives an account of how formal fisheries management started with efforts to understand and respond to changes in the plaice population in the North Sea in the 1860s and 1870s. Cushing notes how the formation of the International Council for the Exploration of the Sea (ICES) in 1902 placed overfishing as central to its work by creating a specific branch to understand and

Box 2: Early Fisheries Policy

An early indication of fisheries policy was that of 1563 when the English government, so concerned to restore the declining marine industry to its former state, proposed that more fish should be eaten and thus one more day in the week was ordained to be a fish day. As a consequence Wednesday was made a fish day and within 13 years an additional 140 fishing vessels had joined the fleet.

Although a good start, this was not considered enough to stimulate the fishing industry or the associated 225 declining coastal communities. A second policy measure was introduced: to subsidise the fishing communities.

Thus began the development and use of two key policy instruments to restructure the fleet and build up fisheries dependent communities.

Source: Starkey, Reid and Ashcroft (eds), 2000

respond to this concern. ICES remains a key source of information about fisheries management and conservation (see: http://www.ices.dk/indexfla.asp). Coull (1972) also gives an account of the historic development of European fisheries linking improvements of technology (such as trawling and the use of steam engines) to production increases and fishing range expansions, and the development of the railways to improved market access. The expansion of the rail network, the development of the mechanised trawler and the greater use of ice transformed the social and economic structure of fishing from being a localized activity to one which was part of the national economy; changing local subsistence fishing communities into centres of commercial operation.

Attitudes to the management of fisheries has changed greatly over the last 200 years but early beliefs about the nature of fisheries have stayed around for a long time. It was not that long ago that people believed that fisheries could not be over-exploited. Roberts (2007) records how Henry Schultes in 1813, in his defence of the expansion of fisheries, stated that the seas were inexhaustible. This was reiterated by Thomas Huxley in 1883 when he stated that the fisheries resources around the UK were so abundant that they could not be depleted by man. Such beliefs continued into the 20th century, but were progressively tempered by the growing realization that at least some stocks were becoming seriously depleted. We now realize that many of the world's stocks are over-exploited or seriously threatened as regularly described by the Food and Agriculture (FAO) of the United Nations in its review of global fisheries (FAO, 2009).

Box 3: Who Pays for the Fishery

An historic anomaly of the fisheries sector has been that it is a free access resource in the financial sense: the fishermen in the UK do not pay for the right to harvest the resource.

Likewise they do not pay for research, management and enforcement of the regulations. The cost of marine research alone is estimated to be in the order of £50 million.

Fisheries management costs are estimated to be around 25-33% of the turnover of the industry.

Source: The Cabinet Office (2004)

However, the belief in the capacity of the stocks to withstand increased pressure permeated management thinking through the 20th century and has resulted in much emphasis being placed on the "development" of the sector in terms of increased or more efficient productive capacity to achieve a number of social and/or economic aims.

The Beginnings of a Tragedy

In spite of the emphasis on fleet development there was an increasing acceptance of the potential of fishing effort to outstrip available resources and attempts were made to try to understand why this should be so. One attempt, which has had great impact on management theory since, was that of Garrett Hardin through his description of the "*tragedy of the commons*". Hardin (1968) outlined the dilemma of ever-expanding effort of individuals to maximize their capture of the benefits of the commons where no controls are in place, and so ultimately "*ruin is the destination towards which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.*" This explanation of the failure of the commons has had a major influence on policy thinking in fisheries for many decades and has contributed to much of the drive for external intervention in fisheries management. This argument has contributed to the economist's view that in the absence of effective property rights the rational fisher is given every incentive to discount heavily any future

economic returns arising from investment in the resource, or any future costs arising from resource disinvestments (Munro and Sumaila, 2002). In such situations there is an inter-group externality where fishers, in effect impose costs on each other (Sutinen, 2008). These views have considerable significance when trying to understand the incentives driving the behaviour of fishers.

Whilst the *tragedy of the commons* was influential in later debates, not everyone agreed with its conclusions or the basis for them. Ostrom (1990) disputes the need for the *tragedy of the commons* to always emerge and identifies characteristics that have enabled groups to manage commons over long periods without bringing about a tragedy of overexploitation. This argument is linked into the ideas surrounding co-management which have evolved in the 1980s and 1990s. Fairlie, Haglar and O'Riordan (1995) summarise the views that refute Hardin's argument in the case of fisheries explaining that fisheries were historically rarely exploited as an open access commons and the enclosure of local fishing grounds has led to a removal of local ownership and management systems with a consequent over-expansion of capital and over-exploitation of resources. There are examples of fisheries in both developing and developed countries where community-based fisheries management have worked successfully.

National Ownership of Over-exploitation

Hardin's proposition, along with the counter arguments, continues to raise its head in the debate about fisheries governance and where decisions should be made: locally, nationally, regionally or globally and the extent to which the industry can regulate itself. National concerns about the expansion of global harvesting capacity and distant water fishing effort have led to demands for greater national jurisdiction over adjacent waters. The need to formally claim exclusive rights to the marine environment to increase economic efficiency of national fleets, to secure national benefits, and to enable effective resource management has contributed to a policy environment which has called for the progressive enclosure of fishing grounds to be enshrined in law. Unfortunately this has all too often led to the process of nationalising over-exploitation rather than stopping it.

The nationalisation process came to a head with the Cod Wars between the UK and Iceland which raised the profile of the fishing industry in the minds of the British public and which raised the importance of national jurisdiction over fishing resources up the policy agenda. This fuelled the international debate which ultimately led to the UN Convention on the Law of the Sea (UN, 1982) which delimits the territorial sea, the Exclusive Economic Zone (EEZ) and the continental shelf and defines the access which nations have to the associated resources. Jónsson (1982) describes the origins and outcomes of the Anglo-Icelandic cod wars within the wider context of international law. As Symes (1998) notes, the enclosure of the world's seas into 200nm EEZs was devastating for the UK fishery and effectively removed much of the fishing opportunity from the UK's distant water demersal fleet.

In 1972 when the UK joined what was later to become the European Union, the Common Fisheries Policy (CFP) had already been established. Leigh (1983) gives an account of the processes of developing the CFP from the early 1960s and the rapid evolution of the policy in the lead up to the UK, Norway, Eire and Denmark joining the EEC. Leigh notes that their accession to the EEC would bring with it large areas of fishing grounds and a rich dowry of fish. He describes how the urgency to agree a CFP before their accession, was driven, at least in part, by a desire to ensure access by the six existing members to the fish in the waters of the joining four. This view is supported and further developed by Holden (1994). For a

comprehensive critical legal analysis of the whole body of fisheries law adopted by the EU up until the mid 1980s see Churchill (1987).

This historic development of policy has created the conditions in which fishers respond to policy and in which policy makers are forced to think and act. But that historic context has never been far from the political economy which is the context in which policies are made and translated into action.

The Political Economy

The political economy concerns the way that politics and economics interact with each other as outlined in Box 4. In reference to fisheries Sutinen (2008) describes the political economy as elected officials, civil servants, and others in the public sector making choices that serve their individual interests. Understanding this process is important to understanding why decisions are made and how they influence social, economic and environmental outcomes. Sutinen discusses the relationship between voters, politicians and bureaucrats. Voters express their demand for government policy and action, elected representatives supply policy and legislation and bureaucrats implement these. Voters use votes, campaign contributions and lobbying to express their demand. Politicians are motivated, in part, by the need to get re-elected and select positions that are likely to influence this. Bureaucrats also operate, in part, through self-interest and are considerably interested in their budget size and number of employees – to achieve this they often appeal to politicians with programmes that would be favoured by voters. This achieves a political equilibrium but outcomes can be distorted by a number of factors:

Box 4: The Political Economy of Fisheries

The political economy is the cross-disciplinary study (commonly including politics, law and economics) of how political institutions, the political environment and economics interact with each other. Often associated with this is an element of self-interest and a desire to influence outcomes in specific ways.

The political economy in fisheries is often not considered when bio-economic models for fisheries management are developed and put into practice. As a consequence the incidence of the successful application of fisheries management is very limited.

An essential part of influencing the policy process is to fully understand and engage with the underlying political economy.

1. Special interest groups;
2. Rational voter ignorance;
3. Bundling of issues;
4. Short sightedness effects;
5. Decoupling of costs and benefits, and
6. Bureaucratic inefficiencies.

Special interest groups can disproportionately affect policy outcomes by their commitments to very specific goals in a world of rational voter ignorance. This is enhanced where individual voters feel that their vote does not count for much and their desire to acquire more information is low. When political choices are bundled together with other issues voters are likely to discount issues of less value and vote on key concerns. If politicians package important issues in complex ways they can influence voting patterns accordingly. Most politicians are concerned with getting re-elected and so tend to have short-

term perspectives. This in turn encourages a mismatch of costs and benefits which are less likely to be judged in the short-term thus encouraging inefficiency.

It is often through the effect of special interest groups and rational voter ignorance that NGOs are able to influence policy and Sutinen suggests that this is quite effective. It is also noted that another special interest group, politically dominant fishing firms (and presumably representative organisations) who are keen to maximise resource rent capture, are prepared to invest more in attending meeting and influencing policy and legislation than smaller-scale operators who feel their vote counts for less.

Whilst Sutinen's portrayal of the political economy may appear simplistic it does illustrate an important part of the management process: that the decision-making incentives for key players are different from each other and this affects how they respond to a given situation and to each other. Understanding how this takes place is critical as decision-making processes become more devolved and involve greater numbers of stakeholder groups. The importance of the political economy to the effectiveness of policy and policy instruments needs to be fully appreciated. A recent OECD report on reducing fishing capacity (OECD, 2009) emphasised this: "*The success of decommissioning schemes and the outcomes for fisheries are influenced by the degree to which the political economy aspects of policy reform affect the design and implementation of decommissioning schemes and associated policy measures.*"

The process of delegating decision-making to different levels has both intended and unintended consequences. "Implementation drift" can contribute to this significantly. Understanding how the political economy operates helps to explain how and why this can occur and further unravels the complexity of the policy process. It can also help NGOs to understand how they can best interact with the policy process to maximum effect. This understanding will also help when decisions are made about how best to implement the detail of the Marine Act and the new decision-making roles are established in the revised CFP.

Risk and Uncertainty

The fishing industry, more than most other economic activities is characterised by risk and uncertainty. Fish are mobile, largely invisible, unpredictable in their behaviour, not owned until after being brought on deck, and highly perishable. The sea where they are caught can be an extremely dangerous medium to work in, where weather is an important and unpredictable factor, and vessels and crew are operating far from normal service providers (such as mechanics, spare part suppliers, vessel repair yards, health services and markets). The amount they are allowed to catch from year to year also varies considerably and unpredictably, as do other management measures, such as days at sea. They sell into volatile markets where fishers have little control over prices, information about selling opportunities and access options to other markets. In addition, input prices can be highly variable, such as fuel prices, further reducing the opportunities for risk reduction.

These constraints are discussed in some detail by Symes and Phillipson (2009). They also note that fisheries is one of the few industries where income is not governed by hourly rates but by a system of fixed shares in the proceeds from the fishing trip.

These factors conspire to make for a highly risky investment and operational context in which to run a business. Such levels of risk are managed to a certain extent by the experience of the fishing crew and

skipper but such risks in most industries would demand high financial returns. They would also require a certain type of entrepreneur, one that not only knows how to reduce some of these risks but also who had a strong sense of determination and commitment to the work.

Profit Margins

How those high financial returns are generated in fisheries has a major effect on fishers' behaviour.

Renewable natural resources such as fisheries are capable of generating resource rents, or profits beyond those needed to cover costs and normal levels of returns. Fisheries resources are a special form of economic good because they are not produced by society and are thus capable of generating economic rents (World Bank, 2006). These rents are a major incentive for capital investment but, because of the open access nature of many fisheries, they can be easily dissipated and the resources over-exploited.

The incentive to search out the highest returns and to capture any rent, offsets the risks inherent in the fishery and acts as an incentive for interest groups to seek to alter management and policies in their favour. For a general explanation on the management of fisheries and the capture of resource rents see Cunningham, Dunn and Whitmarsh (1985). Rents provide an incentive for both fishers and for wider society – rents can be either taken as a super-profit by fishers or captured by society in the form of a royalty.

Box 5: Interacting Policy Measures

Asche *et al.* (2008) discuss the potential of fisheries management measures, such as ITQs, to change fishers' behaviour. The *de facto* ITQ system in the UK (it is an individual vessel quota that is transferable on an annual basis) should, according to Asche *et al.* (2008), generate economic rents through the reduction of operating costs – once the rush to catch the greatest share of the TAC has been removed – and through increased revenues resulting from fishers having better control over both harvest and markets.

But they note that this, in reality, has failed to stop the fishery declining to the point where rents are dissipated. They conclude that in the UK, ITQs cannot generate reasonable profits unless fleet capacity is greatly reduced and in the segment of the fishery studied – the whitefish trawlers - they estimated that capacity would have to be reduced by around 70%.

This conflict between output controls and fleet structure effectively limits the success of both.

In the UK fishery much of the rent has been dissipated through over-capitalisation. Asche *et al.* (2008) refer to this rent dissipation through over-capacity as a subsidy for the coastal communities concerned. In many of these communities the opportunity cost of labour and capital may be close to zero and thus the opportunity for movement of either into other activities is low – this further distorts the incentives in the fishery.

The effects of over-capitalisation and over-fishing on the UK fleet are clear to see. Vaze and Tingley (2004) –from data collected by Watson and Martin (2002) – show the comparison of average earnings and profits per vessel across key sectors of the Scottish fleet. The figures used are without capital charges such as interest and depreciation. In 1997/98 profit margins averaged between 15% and 30% but these fell by around 50% by 2002/01. When interest and capital costs are included the profit margins of many of the fishing vessels are marginal or negative.

In spite of the declining profitability of the fishery, people still continue to invest in the sector. Part of this is because it is still possible to make very good catches and the gamble is still seen to be worthwhile, but other factors are also at play. Salas and Gaertner (2004) note that whilst profit maximisation may

motivate some fishers it is not the driving force of all fishers. Differences exist between operational scales. Symes and Phillipson (2009) discuss the survival of the inshore fleet in difficult financial circumstance and note that the resilience of the small boat sector depends on 1) its ability to target fisheries according to availability; 2) internalisation of what for the large fleets are commonly external costs (maintenance, repair, fish sales); 3) low levels of indebtedness; 4) a diversity of household income sources, and 5) the ethos of self-employment. This enables it to keep going even when profits are low.

Another reason why fishers remain in the fishery even when profits are low is the investment cost of the vessel and gear is often seen as a sunken cost – one that cannot be recovered and is thus discounted from the calculations.

Vaze and Tingley (2004) note that, whilst profit seeking by fishers is a driving force and thus managers do not need to directly encourage actions to improve profits, it is extremely important that they are aware of the impact that different types of management tools will have on profitability.

Financial Pressures

Vaze and Tingley (2004) discuss the sorts of financial pressure that can influence behaviour amongst fishers. Apart from the drive for profit, many fishers have loans from the bank which have been used to purchase of refurbish vessels. Vaze and Tingley noted that, at the time of their study, whitefish boats could cost in excess of £1 million and some fishers had debts of over £2 million. Often fishers have mortgaged their homes and borrowed from family members to enter the fishery. As such they are acutely aware of the risks that they face in the industry as outlined above. Symes and Phillipson (2009) discuss how the rising cost of entering the fishery combined with declining opportunities makes fishing unattractive for many young people. They say this is weakening the social networks around which traditional fishing communities were built and crews are coming from wider areas and often including immigrant workers. This undermines the social capital which has been such an important historic part of the fishing industry.

In order to cope with these pressures there is an increasing move towards industry (rather than individual) ownership of vessels, especially the larger ones (Scottish Executive Social Research, 2002, cited in Brookfield, 2005).

To some extent the fishers are now dependent on the subsidies that the government provides to the sector. The EU's Green Paper (EC, 2009) on the reform of the CFP notes that the income from decommissioning schemes is now built into investment decisions and is an expected part of operational financing.

Vaze and Tingley (2004) also note that subsidies to the sector effectively reduce costs or increase incomes and these distort economic signals in the fishery and so encourage over-investment and over-fishing. Decommissioning, rather than a way of increasing the economic efficiency of the sector has been factored into financial planning. This has the effect of reducing the cost of exiting the fishery and hence this incentivises banks to make riskier loans to the sector. Brookfield *et al.* (2005) point out that the various funding mechanisms (such as PESCA, FIFG and Structural Funds) financed improvements in ports, processing facilities, marketing and aquaculture; funding early retirement for fishers over 55; lump sum payments to crews who have stopped fishing; temporary aid for fishers which have stopped fishing; improvements in working conditions, and improvements in safety, technology and training.

Attitudes Towards, And Incentives For, Compliance

Haapasaari *et al.* (2007) identifies commitment to the process of fisheries management as an important element in ensuring compliance. They also note that commitment has been rarely studied in a fisheries context. They contrast commitment with compliance by saying that commitment has three key elements: 1) an input affirming the relationship and creating self-interest towards it, 2) an enduring attitudinal component signifying the intention to create a stable relationship, and 3) a temporal component encompassing a long-term orientation. This contrasts with compliance which is more concerned with imposed and legally binding management measures.

Haapasaari *et al.* (2007) applied their model on commitment to an Atlantic salmon fishery and found that fishers' perceptions regarding the ability of the stock to recover was a major stumbling block to commitment to the management plan. They also noted a lack of trust between groups of fishers and between fishers and managers also affected commitment. In addition a sense of justice also affects confidence in management - the worse fishers feel they are treated, the less they believe in the benefits of regulations. They found that the most important factor affecting commitment is economic interest (see above). They found that the more that fishers depend upon the resource as a source of income the less committed they are to management measures. They also suggest that increasing participation of fishers in decision-making is likely to increase their commitment.

Vaze and Tingley (2004) note that most fishers do not consider themselves criminals for not complying with regulations and quota restrictions. Most fishers want to operate within the law but recognise that breaking the law is sometimes an economic necessity. Vaze and Tingley note that there is little hard data on the amount of black fish landings but there is a great deal of circumstantial evidence to suggest that it is widespread. Agnew (2004) says that unreported fish landings may be 100% of reported landings and Delaney *et al.* (2007) cite comments by fishers that imply black fish landing is widespread in the UK. The motives for breaking the regulations are linked to many factors. Vaze and Tingley cite the risk and cost of being detected and fined as being important. Fishers are also influenced by the behaviour of their peers and by community pressure. They are very likely to ignore rules that they do not respect.

Trust Between Fishers And Management

Vaze and Tingley (2004) state that the vast majority of fishers at all levels of the industry doubt the validity of the advice official scientists provide fisheries managers. They dispute the negative views of the state of fish stocks, and they argue that the science is too crude to effectively model change in the fishery. They also view scientists as people who talk **at** fishers rather than **to** fishers. Vaze and Tingley's findings are largely supported and elaborated on by Delaney *et al.* (2007) who state that the distrust between fishers and scientists is mutual and many fishers feel that they have a better understanding of the state of the resource than the scientists do. MacGarvin and Jones(2000) note that mistrust in the fishing industry is an endemic and corrosive force, and that deception and secrecy are intrinsic parts of fisheries. Kaplan and McCay (2004) note this breakdown in trust in the US fisheries but also note that cooperative research can renew trust and good faith in the management process. This is being tried by DEFRA in the UK through its Fisheries Science Partnership which was started in 2003 and is designed to build relationships between scientists and fishers and to encourage fishers to commission research.

Understanding of the accuracy of fishers' knowledge about the fishery and fish resources is beginning to increase amongst scientists. Rochet *et al.* (2008) found that the perceptions of fishermen about the changes in the English Channel ecosystem in 2006 were broadly in agreement with scientific research data. Fishermen are also able to respond to changes in stocks more quickly and their perceptions of the stock state may be more current than those of the scientists.

Vaze and Tingley note that fishers also regard fisheries management staff with a similarly jaundiced view and consider that they (the fishers) are largely excluded from the decision-making process. There is a growing awareness of the need for broadening the stakeholder involvement in the decision-making processes around fisheries. This has come out in the EU's Green paper on CFP reform and in the UK government's move towards inshore fisheries conservation authorities (IFCAs) with wider stakeholder participation. Mikalsen and Jentoft (2001) discuss some of the issues emerging from a stakeholder approach to fisheries management. But as Suárez de Vivero *et al.* (2008) note that greater participation is resulting in widening of the spectrum of social actors and this results in the "participation paradox" – "*the greater the number of actors, the smaller the role each plays, and the lesser the importance of traditional sectors."* This can have the effect of making fishers feel that participation is disempowering them.

Marshall (2007) has identified that the way fishermen perceive policies and policy change can significantly affect their behaviour towards it. She notes that a negative perception of a policy can adversely influence their behaviour and emotional responses. She notes that: *"there is a growing recognition that incorporating social knowledge into the management process can significantly assist in the design of policies that not only protect a natural resource but also cause less conflict, inspire higher compliance and minimise the social costs associated with protecting the resource."*

Many fishers are also reported to doubt the value of fisheries management measures. Quoting from Hatcher *et al.* (2000) they state that 84% of fishers believe that quotas are ineffective at conserving fish stocks and 99% of fishers believe that it is wrong to discard marketable fish. Fishers also express doubts that the geographical restrictions placed on their fishing activities really reflect the behaviour of fish. With respect to the dilemmas caused by discarding, Nuttall 2000 observes that some skippers regard the rules as lacking legitimacy and most fishermen experience a keen sense of conflict between their professional identity as fishermen and the dumping of quality fish overboard: "*nobody knows what they should do, whether to land fish illegally or throw it overboard' . The impossibility of fishing without dumping makes some skippers regard landing 'black fish' as 'necessary and legitimate*."

Agnew (2004) says that the mistrust between fishers and management and science can lead fishers to under-report or misreport their catch which further undermines the reliability of data on which management decisions are to be made. Such misreporting is also thought to apply to discards and if this has been a practice for some time it may seriously compromise management decisions based on past catch rates. Agnew (2004) also discusses the issues of uncertainty inherent in the fishery and its effects. He notes four types of uncertainty: 1) system uncertainty - due to variable recruitment to fish stocks, climate changes, ecosystem interaction and environmental variability; 2) Variability in the science – due to data quality and sampling methods, uncertainty in stock size estimation and recruitment strength; 3) uncertainty in management – due to imperfect compliance and deviation from TACs; and 4) uncertainty in catch – especially in a mixed species fishery. This uncertainty is compounded by the short reaction time and long feedback times inherent in fisheries management.

Technological Change

Many of the controls placed on fishers have been on the technology which they use. Changes in attitudes to, and uptake of, technology have affected the lives of fishers.

Fishers and their gear are not static in terms of their efficiency and effectiveness – they evolve over time, sometimes without intent. Fishers get better at what they do as they become more experienced and as Vaze and Tingley (2004) note there is a wide variation in skill between boats. They also say that fishers are good at developing technologies which are not being controlled to compensate for technologies that are being managed. They also note that the management regime for the under 10m fleet is less burdensome than for larger vessels and some fishers have moved into the under 10m fleet but investing heavily in what are referred to as "super-under 10s" such that although there has been a significant reduction in the number of under 10s, the productive capacity of the fleet has increased significantly.

Remoteness, Dependency, Culture And Perceptions Of Self

Many of the communities where fishing vessels are based are remote and at the periphery of economic activities. Some are relatively small communities and fisheries play a major part in the local economy. Brookfield *et al.* (2005) review the concept of fisheries dependency in relation to fishing communities and provide examples from four UK case studies: Shetland, Peterhead, North Shields and Lowestoft. They stress the point that dependency is not just an economic state but may include social and cultural characteristics. It can include the sense of community and the history of the community, and relates to their communal and personal identity. They also explore the meaning of community, going beyond physical groupings to explore how some people may define it in non-spatial terms such as a physiological state of togetherness or identification. They also note that the characteristics that make up smaller fishing communities are the ones that will render them more susceptible to the effects of fleet size reduction and capital concentration e.g. small harbour size, limited support facilities limited social facilities to attract or hold younger entrants to the fishery. They do note, however, that inshore fishing communities do engage in multi-tasking (catching selling and processing fish, repairing vessels, gear and engines) in ways that internalise many of the costs and reduce overheads. They cross-subsidise their fishing operations from other streams of work and engage in multiple stock targeting which would offer no economies of scale to larger vessels. They also note that inshore fishers often engage in niche markets which they are better able to mould e.g. selling high quality locally caught fresh fish. In some situations this can feed into a local restaurant and gastro-pub trade which can build up around local supplies.

Pollard (2004) implemented a study of fishing communities and regional development issues. She notes that fisheries dependency (defined as the percentage of total employment that is associated with fish catching) does not just depend upon fish catching as a source of employment but also employment in processing of locally caught fish and indirect employment in the supply chain. Also included is the employment generated by the spend from these other groups. Other work quoted by Pollard suggest that multiplier effects in fisheries tend to be higher than average. Other benefits from fishing are considered to be associated with tourism, and with the maintenance of social and cultural fabric.

Closely linked to the employment dependency on fishing is the culture that such dependency generates. This also has a major influence on the way fishers feel, think and react. The culture associated with fishing has considerable literature devoted to it. McGoodwin (2001) provides a detailed background to the

cultures of fishing communities from a global perspective. He notes that *"Fishing, as one among many ways of providing for human existence, requires certain human adaptations and behaviors, with these adaptations and behaviors necessitating the development of certain cultural characteristics. These adaptations are rooted in the requirements of exploiting particular marine ecosystems with whatever technologies a people have available at a particular time, and then are ramified through the cultures of their fishing communities. Therefore it is important to underscore that a fishing community's approaches to fishing, the fishing gear it utilizes, and its organization of other fisheries activities is usually the result of considerable experimentation over a long period of time."* McGoodwin goes on to say of fishers' sense of pride and culture that: *"Among the members of small-scale fishing communities who fish at sea, there is usually a profound pride in their occupational identity as fishers and a correspondingly high devotion to the fishing way of life. Fishing at sea requires high degrees of independence, self-reliance, autonomy, risk taking, and outdoor work challenging nature, and if these are important cultural characteristics of the fishing occupation they are also necessarily important characteristics of individual fishers. Moreover, where fishers work at sea under particularly dangerous conditions, or where they harvest particularly large or valuable marine species, the fishing occupation may take on an heroic aura in their home communities. Indeed, in many small-scale fishing communities a mystique often surrounds fishing activities."* This cultural identity defines many of the values that fishers have about life, external interference and what is right.

According to Rose (2008) fishers in England have a strong sense of identity with the sea which is quite different from that of the general public (see below). This is combined with notions of the right to fish embodied in the status of fisheries as being a common property resource.

This is not to say that attitudes to working in fisheries cannot change. Much work has been carried out around the world on the diversification of livelihoods for fisheries dependent communities, but the responses to change are often culturally based. They also have to take into account how such opportunities might affect investment in the fisheries sector and its important role in the local economy. Phillipson (cited in ESRC, 2008) says that opportunities for renewing skills, experience and traditional knowledge are declining in some Scottish communities because the regulatory and economic pressures, unattractive working conditions and low levels of confidence in parts of the industry are acting as barriers to new recruitment. He notes that employment in fisheries in Scotland has declined by 40% in the last 15 years. The future may be as much about how the qualities of the fishing culture can be harnessed to embrace change as they are currently about resisting that change.

Influence Of Public Perceptions On Fishers And Policy Makers

Fishers do not operate in isolation, they respond to the pressure from people in their own communities and from wider public perceptions. Understanding those perceptions is important to understanding the response of fishers and to changing that response.

Rose (2008), as part of presenting his own research findings on perceptions of the undersea landscape, reviews a number of studies that have been carried out on people's perceptions of the sea and coast, marine conservation, sea and fish, and eating fish. He notes that people in England have a strong affinity for the sea, especially the coast but attitudes to undersea landscape are quite different. Most people know

little about the undersea environment and have barriers to discussion about it, they also want to avoid criticism of fishers.

The extent to which fisheries is on the public radar in the UK is limited although this increases from time to time e.g. in the Cod wars. Mikalsen and Jentoft (2008), from a study of participation in fisheries management note that in the six countries they studied (including the UK) fisheries attract little public attention and the demands for openness have therefore been moderate. In addition they say that issues to do with fisheries management do not loom large on the agendas of politicians and governments.

But public perceptions can and do influence behaviour of fishers towards management processes. Public attitudes to law breaking and compliance, and to damage to the environment caused by fishing, feedback into fishing communities and can affect behaviour.

Public perceptions are important for influencing policy makers, especially politicians. If we believe Hilborn's (Hilborn, 2007) description then politicians would very much like to manage the extent to which the public get upset by fisheries-related activities, more as a means of keeping the peace than resolving the underlying issues. But the way the public views the sea and fisheries is complex and is concerned very much with the way the issues are presented. Jones (1999), whilst looking at the economic and socio-cultural priorities for marine conservation, says that *"The priority which is attached to the existence value of marine wilderness in relation to the non-target impacts of fishing is arguably relatively low due to the alien, remote and hidden nature of the marine environment."* Jones contrasts this response of the public to Shell's plans to dump the decommissioned *Brent Spar* oil rig to the west of the Hebrides in 1995. This reaction is reported to be as a direct result of Greenpeace's publicity campaign. Greenpeace's "Walls of Death" publicity programme against driftnets was also reported to be very influential in affecting public views but Jones suggests that this was because the lives of charismatic megafauna such as dolphins, whales and turtles were at stake.

Market Pressures

One aspect of how wider society engages with fisheries that is becoming more important is that concerned with the certification fish. Eco-labelling is becoming a significant part of the global fish trade which has been embraced by supermarkets and NGOs alike.

In addition to market pressure for certification there is increasing interest from governments to engage in, support or promote certification as a way forward and Shelton (2009) notes that NGOs are increasing pressure on governments and regional fisheries management organisations in this direction.

The OECD and FAO organised a Round Table on Eco-labelling and Certification in the Fisheries Sector in April 2009. OECD and FAO (2009) provides a summary of the proceedings of that meeting. From that discussion it appears that the response of the public to eco-labelling is somewhat mixed. The report states that there are now so many eco-labelling schemes that the public are becoming confused by what was described by the Round Table as "eco-labelling noise" to the extent that the public are tending to shift responsibility to their trusted retailer to define the boundaries of their ethical purchasing decisions. The report says that it is no longer consumers or NGOs pressuring retailers to buy eco-labelled fish, it is rather enlightened self-interest of the retailers which is driving the process.

In spite of their voiced concerns about the environment it is other factors that mainly determine the purchasing decisions of the consumer. In the current financial climate, price is seen as a significant factor and the industry cannot rely on consumers being prepared to pay a premium for eco-labelled fish. But the pressure from retailers is having an effect on fishers' behaviour with more fishers wanting to join such schemes (see box 6).

The OECD and FAO report discusses these responses of the fishing industry to eco-labelling and states that the capture segment of the industry seems to be resigned to the existence of eco-labelling and sees it as just another cost of operating. In the past the benefits of certification to fishers have been identified as access to new markets, consolidation in existing markets, and potential price premiums. The report suggests that these benefits might have been over-exaggerated. The report notes, for example, that the Alaskan salmon fishery, which did have Marine Stewardship Council (MSC) certification, has now chosen not to continue this on the basis that it already has established credibility in the market place.

Box 6: Commercial Sponsoring of Certification in Scotland

The Isle of Lewis langoustine fishery that supplies some of the country's top restaurants has gained certification against the Marine Stewardship Council's (MSC's) standard for sustainable and well managed fisheries. The fishery, which was sponsored through its assessment by Young's (a large private sector fish processing company), also supplies langoustine tails for scampi production. The fishery can now carry the MSC eco-label on its products

The fishery has benefited from Young's introduction of some groundbreaking technology called 'Young's Trace' and reports environmental and economic benefits including the reduction of juvenile catch and a consequent increase in the percentage of more valuable larger langoustine caught.

Source: http://www.youngsseafood.co.uk/

The report also raises a key question of the equity of certification systems. Given that it costs between €10,000 and €100,000 for a full assessment (OECD and FAO, 2009) it is likely that the cost will affect the willingness of many smaller-scale fisheries to participate given the reduced profitability in the current fishery. Some fisheries are beginning to explore these issues by seeking sponsorship from wholesale, retail or processing companies (see box 6). There is also the equity issue of the cost of certification acting against small-scale fisheries in developing countries selling fish into Europe.

Summary And Conclusions

The path from intended to actual impacts travels through a set of contextual filters that deflect and transform the actual outcomes. These outcomes will vary between subsectors and from place to place. Understanding and shaping the incentives that drive political decisions is key for promoting robust conservation policies. Likewise, effective management must take into consideration fishers' behaviour to management decisions because the uncertainty of fishers' behaviour is likely to influence outcomes and fishers' support for plans is essential to their success.

There are many factors that influence the decisions that are made by policy makers and by fishers in setting and responding to the policy framework for fisheries. The key findings from this section include:

i. The historical context surrounding fisheries has influenced thinking in ways that have profound impacts on fisheries sustainability and aquatic habitat conservation decisions. Examples include:

    a. The resources of the seas are limitless;
    b. Fishers have a right to free access to the resource;
    c. Fishers are not required to pay management or research costs;
    d. Ensuring food security creates pressures for increasing catching capacity.

ii. The incentives which fishers have to comply with the management regime which is in place need to be based on a sense of commitment to the management process if they are to be truly effective. All too often they are based on rather ineffective enforcement.

iii. Every day many fishers risk loss of home, income and even life. Such financial and personal pressures affect their willingness and ability to comply with the management regulation.

iv. Willingness to comply with management measures is further challenged by the lack of trust and sense of injustice between fishers and researcher and managers.

v. Decision-making incentives for key players are different from each other and this affects how they respond to a given situation and to each other.

vi. Technological creep and skills development can compromise the impact of input controls.

vii. Dependency (both economic and psychological) and vulnerability are key features that tie many fishers to that livelihood.

viii. Whilst certification systems appear to be starting to have an effect on resource management, the public are confused about the meaning of the different systems.

ix. The public seem to be more able to engage more positively with the plight of fishers and fishing communities than they do with the plight of the marine environment.

Actual Socio-economic Impacts of Policy and Management Measures

Introduction

Whilst specific policies and policy instruments may be designed to have particular impacts, attributing impacts in a direct cause-effect way is often very difficult. As this review has demonstrated, the complexity of policy objectives and the variability of response to these objectives by management agencies and fishers make objective assessment of specific policy measures rather difficult. This section, therefore, initially reviews the changes in specific socio-economic areas, such as fleet structure, employment and profitability and then goes on to assess what is known about the linkages between specific policies and impacts.

Socio-Economic Impacts On The Fishing Industry

The direct impacts of fisheries policy and policy measures on the fishing industry covers structural areas of the fleet and its operation, the profitability of the fleet, employment across the sector, community development, and safety in the sector.

Impacts on the Fishing Industry Structure

The structure of the fishing industry is gradually changing over time in response to the various policies and policy measures.

Since the mid-1970s, the UK fishing industry has had to face a major restructuring of its activities following the collapse of the distant water fishing industry, following the extension of 200nm EEZs, which led to a marked decline in the fortunes of the English and Welsh distant water ports of Hull, Grimsby, Fleetwood and Milford Haven, and the accession to the European Community. In the face of the loss of access to distant water fishing grounds in the late 1970s, the volume of demersal landings by UK vessels has declined since a peak in the early 1970s from somewhere in the region of 780,000 tonnes to around 206,800 tonnes in 2008.

There has been a very clear relocation of the centre of gravity for the UK industry away from the Humber ports to north east Scotland (Symes, 1998) see Box 7. The Marine and Fisheries Agency (MFA, 2008) statistics show that, whereas in 1970 Hull and Grimsby together accounted for 363,000 tonnes (or 37% of the UK total), today they do not make it into the top 20 ports. Peterhead is now the UK's leading fishing port handling 113,300 tonnes in 2008 and together with Lerwick and Fraserburgh accounting for 51% of the UK landings (by quantity) in 2008. In England, the leading ports are focused in the South West, with Plymouth, Brixham and Newlyn accounting for 7% of UK landings (by quantity) in 2008. These landings represent a significant impact on the economies of these different port towns.

There has been a steadily rising dependence of the UK market on imported supplies of fish and fish products. Today the UK is a net importer of fish with the crude trade gap (imports – exports) standing at 364,000 thousand tonnes in 2008 – a rise of 30% on the previous year (MFA 2008).

Box 7: Outline of Changes to the Scottish Fleet

The decline in the industry has been significant over the last two decades. The 2007 workforce was approximately half that employed in the early 1970s. There were 4,408 fishermen regularly employed on Scottish-based fishing boats in 2007. Another 951 irregularly employed brought the total employment in fish catching to 5,424. In terms of both weight of fish and monetary value, the bulk of fish were caught by larger boats. Of the 2,191 registered vessels, 1,449, or 66%, are less than 10 metres long but they were responsible for only 11% of the total catch by weight and 9.7% by value. Nevertheless, smaller boats are responsible for a significant proportion of the employment.

Almost a quarter of the labour force operates from the fishing port districts of Peterhead and Fraserburgh. When combined with the smaller numbers of fishermen working in the port districts of Aberdeen and Buckie, the north-east contains 32% of the total labour force and lands approximately half of the fish. The only other port districts with more than 500 fishermen are Ayr, Shetland and Stornoway. Within the North East, the recent decline has been steeper in the port district of Buckie, with a 67% fall in fishing employment from 900 in 1994 to 293. In Fraserburgh, there has been a 54% decline, and in Peterhead a 42% decline.

The demersal sector has been most affected by the decline of fish stocks, particularly of cod. In 2005, pelagic fishing accounted for only 5% of employment in fish catching. It was estimated in 2005 that small inshore shellfishing boats (typically under 10 metres) accounted for 41% of employment; smaller mixed shellfish and demersal fishing boats (averaging 14 metres) for another 21%; and the larger demersal fishing boats accounted for 33%.

Source:
http://www.scotland.gov.uk/Publications/2009/07/10100136/3

Prior to the early 1990s the licensing of vessels was restricted to those over 10m in length and so statistics are limited. The Marine and Fisheries Agency records statistics on major indicators associated with the sector which are published annually (MFA 2008). In 1999 the UK fleet size was 8,039 vessels. By 2008 this had reduced to 6,573 vessels representing a fall in numbers of 18%. The capacity of the fleet in Gross

Tonnage over the same period has declined by 22% and the power by 15%. Scotland has a higher percentage of larger vessels than England with – 20% of the Scottish fleet exceed 15m in length compared with 6% in England. These figures indicate a very gradual decline in vessels capacity measured by numbers, gross tonnage and power, but the EC (2009) estimates that this has been offset by technological progress in fishing efficiency.

The majority of the UK fleet (77%) is made up of the inshore boats under 10m in length, using mainly passive gear. The fleet in 2008 comprised 5,077 of boats under10m in length vessels and 1,496 boats of greater than 10m in length (EU Fisheries Facts and Figures2). The percentage of the fleet made up of smaller inshore vessels did not change significantly between 2005 and 2008 (MFA 2008). The under 10m vessels account for just 9% of the fleet's capacity. However, vessels over 18 metres in length account for just 8% of the total number but for 78% of total capacity.

England has the largest number of vessels, accounting for 49% of the total UK fleet with Scottish vessels making up 34% of the UK fleet. However, Scotland has the highest share of capacity (GT), 61%, compared with 29% in England (MFA 2008). The disparity between vessel numbers and capacity levels between England and Scotland can be explained by the different structure of the fishing fleets. Scotland has a higher proportion of large vessels than England. For example, 20% of the Scottish fleet exceeds 15 metres in length compared with 6% in England. The capacity of the 165 vessels over 24 metres in length in Scotland exceeds the total capacity of the entire English fleet.

Impact on Fishing Profitability

The recent CFP Green Paper (EC, 2009) stressed that while a few EU fleets are profitable with no public support, most of Europe's fishing fleets are either running losses or returning low profits – although this can be highly variable from place to place (see box 8). Overall poor performance is due to chronic overcapacity of which overfishing is both a cause and a consequence: fleets have the power to fish much more than can safely be removed without jeopardising the future productivity of stocks. Capacity reductions in recent years have not been sufficient to break this vicious circle. Vaze and Tingley (2004) show how profit margins across the UK fleet had fallen by 50% between 1997/98 and 2000/01. Whittaker (2004) observed that UK landing prices have come under increasing pressure due to international competition,

Box 8: The Profitability of the Kent Inshore Fleet

Just (2004) carried out research into the operation of a small inshore fishery based on the Northeast Kent coast. As regards earnings Just says: "*As mentioned above, it is almost impossible to generalize about fishermen's earnings, since these depend on a) the type of boat and of fishing; b) the degree of skill and 'commitment'; c) the stage of life that fishers have reached.*

Again, what can be said with confidence is that fishing can be a lucrative undertaking. The simplest way to demonstrate this is to take the case of (Mr)'C'. In 2004/5 it was generally accepted that 'C' had had a gross turnover well in excess of £200,000, and 'C' put his individual earnings at £70,000+ p.a. 'C', however is the exception. There are other fishermen in both Whitstable and Ramsgate who are making little and barely covering costs, a subject of much local discussion, i.e. will 'X' 'make it'. The gross discrepancy at first seemed puzzling, but it should be noted that while 'C's' trawler is under 10 metres, it is powerful. He can thus pull bigger nets (in rougher seas). Commenting on his friend 'K', also an experienced but nowhere so successful a trawler, 'C' said that 'K' simply did not have the horse-power."

[2] http://ec.europa.eu/fisheries/fleetstatistics/index.cfm?ctyCode=GBR

despite a reduction in local catches.

In the regular fishing fleet economic survey SEAFISH provide details of the costs and earnings across the fishing fleets in the UK. The 2006 survey (Anderson *et al.*, 2006) found that despite increased earnings, rising operating costs (notably fuel), meant that less profit was generated by the UK fishing fleet in 2006 compared to 2005.

Vivid Economics (2008) (in research commissioned by DEFRA) utilised the data published by the Marine Fisheries Agency to analyse the income levels across the UK fishing industry using the figures for Gross Domestic Product (GDP). GDP is a measure of economic output. In their analysis they found that the index of GDP per fisherman (a good indicator of fishers' personal income) ended the period (1996-2005) at almost exactly the same level as it began it. This suggests that there was no increase in labour productivity over the period, which is an indicator that crew earnings from fishing stagnated while they rose across the economy as a whole. At the same time, the absolute level of gross GDP (UK income) from fishing fell by one third. The number of fishers fell by one third correspondingly.

In a report for the Crown Estates, Pugh (2008) reported that sea fishing is a small and slowly declining part of the UK economy. In 2005 it was about 3.4% of the larger "agriculture, forestry and fishing" sector, which in turn was about 1% of the total UK economy. Likewise, in relation to national employment fisheries contributes just 1% of jobs, though it may attain regional and certainly local importance.

The fall in GDP suggests that the income to the UK from its fisheries is being eroded. The value of marine fish assets (the stock in the sea) is not formally counted within national GDP, however, in a 2004 report for the Office of National Statistics (ONS) Palmer (2003) did attempt to construct both physical and economic accounts for UK fisheries. Palmer analysed nine stocks (two of cod, two of plaice, two of sole, two of whiting and one haddock) which were selected on the basis of their commercial and biological importance in addition to the availability of data required to construct both sets of accounts. The Physical accounts are the opening and closing stocks of the whole stock regardless of which country's fleet is harvesting it, whilst 'economic accounts' are a measure of the net present value of income (rent) that the UK's share of that stock is expected to generate in the future. The study indicated how overfishing has negatively impacted on these stocks. Overall, the stocks have declined over the most recent 20 year period and levels of economic rent tend to be negative.

As Vivid Economics (2008) conclude, the complete picture for UK fisheries is likely to be one of depleting assets, falling UK income, and fishers' incomes falling relative to other workers.

Impact on Employment

Whilst the capacity of the fleet has shown little change as a result of the policies and strategies, employment in the fishery has changed significantly. In 1938 the catching side of the sector alone created work for nearly part-time and full time fishers 48,000 people. This was reduced to 23,309 in 1980 and then to 12,761 in 2008. This represents a loss of 73% of the workforce (MFA 2008).

As of 2008 the distribution of this employment was England 45%, Scotland 42%, Wales 8% and Northern Ireland 5%. In 2008 SEAFISH commissioned an assessment of the state of the UK fish processing sector (Brown 2008). The assessment showed that since 2004, the number of seafood processing units in the UK

has decreased (Table 1 below). In the past four years the number of processing units has decreased by 15% from 573 to 479 units. Employment in the industry has also reduced in the period since 2004. There are now 14,660 FTE jobs in the seafood processing industry in comparison with 18,180 FTE jobs four years ago.

Table 1: UK Seafood Processing Industry Population- FTEs and units

Seafish Processors	**1986**	**1995**	**2000**	**2004**	**2008**
No. UK Employees	19,539	19,659	22,255	18,180	14,660
No. Processing Plants	988	719	541	573	479
Average	19.6	27.3	41.1	31.7	30.6

Source*: *Brown 2008

In a report that consolidates a series of studies on employment and the level of dependency on fishing across the European Union, Goulding *et al.* (2000) observed that fisheries-related employment is affected by several factors. Like other industries based on exploitation of natural resources, it is subject to global trends in supply and demand, and from competitive pressures which periodically affect the business and these can affect employment levels in both catching and processing. Capital investment in pursuit of improved efficiency and productivity can also lead to reductions in employment. Regulatory requirements for higher standards of safety and hygiene also impact on employment by increasing costs. In addition, in the EU, the structural component of the CFP, as implemented through the Multi-Annual Guidance Programmes, requires Member States to ensure a phased reduction of registered fishing capacity in selected fleet segments.

Impact on Fishing Communities

There are a few areas around the UK coast with a significant level of dependence on fishing related activities. Most of these are located in the north and west of Scotland and in the Shetland Islands, though some of these more vulnerable areas are at present cushioned by employment in oil and gas related industries. In a series of EU wide studies on fisheries dependency Goulding *et al.* (2000) observed that one of the principle benefits of commercial fisheries is the socio-economic impact on jobs and incomes, not just in fishing, but also in up- and down-stream activities. These benefits frequently fall in areas which have few other alternative economic activities. However, they found that there is only one coastal community in England and Wales where more than 4% of employment is related to fish catching, namely Brixham in Devon, where it is over 10% (Cabinet Office, 2004). Thomson (2002 – in Brookfield *et al.,* 2005) reported that in Scotland fish catching, fish farming and processing account for just 0.9% of employment and in the coastal regions only 1.6%, but in Shetland they account for 11% and in Peterhead 14%. Other communities where fishing is a significant employer are found in the South West England, North East Scotland, East Anglia and the western extremities of Wales.

A study commissioned by Seafish (undated) points to the potential impact of removal of the UK fishing industry. The complete removal of the fish catching side would lead to a loss of some 28,691 full-time equivalent (FTE) jobs in the UK and to a decline in GDP of 0.07% (£672.7 million). The removal of the

fish processing sector would result in a decline of 118,320 FTE jobs and to a decline in GDP of 0.48% (£3,891.1 million). These impacts would be markedly higher in Scotland than in England.

Brookfield et al. (2005) observed that even in a community where fisheries-dependency has diminished in economic terms the people valued the fishing industry for its crucial role in the identity of the community. In such communities (e.g. North Shields, Lowestoft, Hastings and Buckie) the authors observe "it appears that a fisheries tourism industry has often succeeded the 'real' fishing industry". Fishing communities such as Hastings and Buckie have invested heavily in promoting their fisheries heritage for tourism.

Any decline in the role of fisheries can have very significant multiplier effect on the wider economy and, in extreme cases, can threaten the viability of the communities. Symes and Phillipson (2008) discuss the, often unseen, linkages between fishing and the local community and how the survival of individual fishing units through hard times is supported by family and community. Many of these remote fishing communities are already suffering from declining local services and employment reductions in the fishery have contributed to this. The decline in social networks in fishing communities, mentioned above, is according to Symes and Phillipson, replacing communities that were once bound by common interest into dispersed occupational communities embedded in a more diverse economy. The value of social networks and their shared knowledge can be important to current and future fisheries management, as Symes and Phillipson note: *"fishing communities are often reservoirs of knowledge, experience and understanding of local fisheries that cannot be replicated in any other form."*

Within their study of dependency, Brookfield *et al.* (2005) also discuss the efforts that communities and government have made to reduce dependency, principally through livelihood diversification. In Shetland the revenues from the oil industry provide a valuable reserve to help the community to develop. In Peterhead where 28% of all jobs were in the fisheries and ancillary sectors, the council has been more proactive in developing economic diversification in parallel with supporting the regeneration of the fishing industry. North Shields has diversified its fisheries by encouraging greater landings from non-resident fleets and by developing its fish processing capacity. Only 10% of the landings were from local vessels. The fishing industry has become an iconic growth pole for other industries to develop based on the town's historic identify with fishing rather than on fishing itself. In conclusion they note: 1) communities with high dependency have clear political support at the local level; 2) there is an increasing tendency for fisheries dependent communities to find ways of marrying fisheries development and economic diversification; 3) fisheries dependent communities have recognised the historic and cultural value of fishing; and 4) there is a distinction between virtual and real fishing industries - real fishing is product based whereas virtual fishing is image-based and reflects the idea of a fishing industry in a community – an icon or branding mechanism. In reality no two dependent fishing communities are the same and each has to develop its own strategies to cope with change.

Whereas the offshore fisheries sector in the UK is concentrated in a few communities the inshore fishery is scattered over many locations. This makes monitoring the effect of these fisheries difficult. However, Pollard (2004) does note that they are likely to have a significant tourist effect, to influence the image of an area, and to provide informal labour opportunities.

In fisheries dependent areas the effects of fisheries restructuring have had particular impact where a whole community is affected, where other industries in the area are tied in closely with the fishing

industry, creating negative up- and down-stream effects, and where there are few opportunities for finding alternative work. In a study of fisheries dependent communities in Scotland, Jameison *et al.* (2009) noted that as the structure of the fishing fleet has changed – with less smaller family owned vessels and more corporate ownership - the cultural make up of many fishing communities, especially in kinship and participation has changed. These finding reflected those from Stead (2005) in her study of changes in Scotland's fishing communities. Changes in quotas have created concerns regarding discards of fish and Nuttall (2000) (cited in Scottish Government, 2009) recorded the wider impacts of discarding on the communities in North-East Scotland. He noted that where fish had been landed illegally, the stigma attached to the subsequent prosecutions had adversely affected the wider community and social and economic contexts that derived their identities from fishing.

A pressing issue for fishing communities concerns the means through which the industry is renewing its human capital, skills and traditional knowledge, especially as restructuring has shaken the industry's social networks and intergenerational continuity. The ESRC (2008) reported that regulatory and economic pressures, unattractive working conditions and low confidence levels were thought to contribute to problems attracting, recruiting and retaining fisher crews, especially young workers from the UK .

Indeed, there is a strong feeling amongst participants in the fishery that many of the lower level jobs in UK fisheries are being taken by migrant workers from South East Asia or Eastern Europe although no published evidence could be found at the time of this study to support this.

Impact on Mortality Rates Amongst Fishers

Part of fisheries policy has been to improve safety within the fisheries sector. However, the fisheries sector remains the most hazardous industry in the UK. Several studies have been undertaken to explore the health risks in the fishing industry (Roberts 2004, Lawrie *et al.* 2004 and Matheson 2001). In Roberts (2004) study of the rates and reasons for fisheries-related mortalities he observed that between 1976 and 1995, there were 616 fatalities in the British fishing fleet representing a fatal accident rate of 52.4 times higher than in the general workforce and of Great Britain. Most deaths (60%) occurred as a result of casualties to vessels, often associated with extremes of weather. 13% of the deaths were due to natural causes and various studies have been made on the health of fishers compared with wider society suggesting that boredom, poor diet, harsh working conditions and separation from family all adversely affect health.

During this period the annual mortality rate did not change substantially despite efforts to improve safety within the sector. Roberts (2004) speculated that the financial pressures on the fishing industry coupled with catch restrictions may lead fishers to take greater risks by taking under-manned and badly maintained trawlers to sea and to continue fishing in rougher weather. According to Roberts (2004), in the current climate, the industry is unreceptive to the introduction of additional safety regulations, especially those developed by those outside the industry.

Understanding Specific Impacts Of Policy And Management Tools

Whilst the previous part of this sub-section discusses impacts in general, this part aims to identify causal linkages between impacts and specific policy measures.

Structural Measures

Multi-Annual Guidance Programmes (MAGPs) were introduced to plan the fisheries more effectively and this led to some stabilisation of national fleets but still at levels of capacity greatly in excess of those required to harvest the resource. Symes and Hoefnagel (2009) note that attempts to bring fishing capacity in line with fishing opportunities through MAGPs has largely failed due in part to the persistence of EU grant aid to assist new building and modernisation of existing fishing vessels. The external fisheries policy has provided opportunities for some parts of the EU fleet to operate in third country waters thus reducing the rate of increase in fishing effort in EU waters. It also increased access to fish for the EU market but these benefits have often been achieved at the expense of the national fishers and consumers in the third countries concerned, often very poor people.

Banks and Reed (2000), quoted in Vaze and Tingley (2004), state that the Scottish pelagic fishery experienced significant structural change and technological development during the 1980s and 1990s: highly powered, large super-trawlers were introduced and important technological developments were made in fish-finding equipment, gear design and on-board equipment. However, the estimated impact on productivity was relatively low: 0.38% per year equating to a 5.9% improvement over 15 years. The benefit of the efficiency improvements was being seen in reduced operating costs and onboard storage as opposed to increased catches. The quota management system and market dynamics played an important role in steering the benefits of technological change away from increased landings.

Asche (2008) highlighted that simple buy-back programmes that purchase inefficient vessels out of the fishery have not helped to solve the problems of excess capacity. As it is the least efficient vessels that are generally removed first, a substantial proportion of the fleets will need to be removed to have any impact of significance.

Declaration of the EEZ

The evident failure of the international regulations to restrain levels of fishing activity by distant water fleets, the inability of the coastal states to win sufficient preference in the allocation of quotas and the gradual depletion of the fish stocks caused Iceland to declare, in 1975, a 200 mile EEZ around its coasts. The rapid spread of EEZs throughout the North Atlantic profoundly altered the political geography of the region within the space of a few months and initiated a rapid restructuring of the fishing industries of many North Atlantic coastal states. For the UK's fishing industry, the effects were traumatic. The distant water fleet, previously responsible for well over a third of all demersal landings at British ports, was denied access to its traditional fishing grounds, providing a catalyst for an increase of fishing effort within 'domestic' waters. The UK's own EEZ was severely truncated by the median line principle and scarcely any part the zone extended the full 200 nm from the British coastline, except for the contentious area around Rockall (Symes, 1998).

Subsidies

On top of direct aid from the European Fisheries Fund and similar national aid schemes, the industry benefits from a number of indirect subsidies, the most important of which is the overall exemption from fuel taxes. Unlike other industries, fishing also benefits from free access to the natural resource it exploits and does not have to contribute to the public management costs associated with its activities e.g. control and safety at sea.

Munro and Sumaila (2002) undertook an assessment of subsidies in fisheries in the North Atlantic. They focused on the impacts of subsidies upon resource management and sustainability. Their assessment on the subsidies provided to marine capture fisheries of the North Atlantic is shown in Table 2.

Table 2: Subsidies to the UK Fleet and their Impacts

SUBSIDIES *(approx % of total UK fisheries subsidies)*	**TYPES OF IMPACTS**
• Management, research, enforcement and enhancement (64.4%)	• Don't directly increase the prices received by fishers or lower their costs. • These should not lead to the intensification of the resource exploitation and should actually promote sustainability.
• Fisheries Infrastructure (11.7%) • Investment and modernisation, (3%)	• Directly reduce fishers costs • Likely to have negative impacts on resources.
• Decommissioning and license retirements, (17.9%) • Access to other countries waters(EU led),	• Decommissioning subsidies not only stimulate investment in fleet capacity directly but also lead to bankers offering those investors more generous credit terms (Jorgensen and Jensen 1999). • Third country access agreements may be positive for EU but likely to be at the expense of the third country.

Adapted from Munro & Sumaila 2002

Whilst some of these subsidies may not appear to directly benefit the fishers, they would certainly have an impact on profitability if the costs had to be met by the industry instead of by the taxpayer. In several Member States, it has been estimated that the cost of fishing to the public budgets exceeds the total value of the catches (EC, 2009).

Technical Measures

So far there seems to have been little written on the direct impacts of technical measures on the fishery.

Heikinheimo (2006) undertook a comprehensive bio-economic view of mesh size regulations and shows that larger mesh sizes do produce higher catches of larger fish in the long run, but the short run hardship for the sector remains a constraint which can be only resolved by appropriate political decisions.

Marine Protected Areas (MPAs)

Assessing economic consequences of closed areas is becoming increasingly relevant as this measure may be gaining in popularity and other users of marine space claim areas for wind mill parks, cables or other types of exploitation.

In a paper on the role that marine reserves can play in fisheries management, Hilborn *et al.* (2004) are clear that marine reserves have shown promise, but that they are not a panacea for fisheries management problems. Laffolley *et al.* (2004) show that there is good evidence to support the biodiversity benefits of MPAs, but note that the evidence for fisheries benefits is mixed. The abundance of fish and shellfish has

been shown to increase within protected areas closed to fishing , but increase in fisheries yield will only occur if the fish (including eggs and larvae) leave the area closed to fishing in sufficient quantity to compensate for the loss of yield caused by closing the area. However, Hilborn (2004) emphasizes that the fisheries management will only be improved if the roots of fisheries management failures are addressed.

In a socio-economic analysis of MPAs as tools for fisheries, Alban *et al.* (2006) review a wide range of literature relating to the impacts of MPAs and also to the methods used for calculating those impacts. While this review shows a wide diversity of costs and benefits of MPAs it does highlight the fact that the literature is dominated by studies focused on MPAs in tropical ecosystems. Sanchiro *et al.* (2002) noted that a lot of research has concentrated on the economic value that MPAs generate via ecotourism and fisheries, on their intrinsic value to society and on their biological and ecological effects rather than on the socio-economic costs of MPA introduction. This despite the fact that fishers will incur the greatest impacts of MPA introduction, with higher impacts being felt in isolated coastal areas than in urban coastal communities (Hatchard, 2007).

Sumaila and Armstrong (2006) studied the distributional and efficiency effects of MPAs in the northeast Atlantic cod fishery. They concluded, from their modelling work, that MPAs are likely to yield benefits to participants in fisheries in the long term but that a key challenge will be dealing with short term losses and understanding and managing the issues that arise from distribution of these benefits between fishers.

Impact on Wider-Society

The impact which the policies and policy measures have had on wider society are not always clear given that the industry is relatively small in economic terms although it retains a larger than expected position in the minds of the public. This contrasts with the alien, remote and hidden nature of the marine environment, which reduces the priorities that society attaches to it (Jones, 1999).

The public are most affected by the availability and price of fish, although there has also been a growth in awareness of fish from sustainable and unsustainable sources.

The Availability and Price of Fish

Perhaps the most direct link that people in wider society have to fisheries policies and management strategies is through their consumption of fish. Whittaker (2004) reported on how the global supply of fish has been steadily increasing over the past 30 years fuelled in part by the growth in farmed fish but also by the development of fisheries surrounding developing countries. This expansion of supply has been met with a slowly but steadily increasing demand for fish in the UK over the past ten years. Total household expenditure on fish was £2.4billion in 2002, up from around £1.7billion in 1993.

Pugh (2008) reported that the average consumption of fish per person per week in the UK in 2004-5 was 158 grams and the average expenditure was 99 pence (£2.85 per pound). For comparison, £4.94 was spent on meat. Fish is also consumed in restaurants and in take-away form from fish and chip shops. A small proportion of the catch is used to make fish oils and animal feeds.

Salz *et al*. (2007) reported on how trends in the consumption of fish are driven by broad developments which affect the food consumption in general – individualization, convenience food, increasing role or retail chains, consumer awareness in relation to intrinsic qualities like health or sustainability. EU fish

consumption depends for 50-60% on imports, which are increasingly sourced as farmed fish, as retailers can rely on constant supply and quality.

FAO (2004) showed in its commodity outlook that on a global scale, after accounting for inflation, fish prices remain relatively constant, while prices of most other food commodities have been decreasing for many decades. This indicates that consumers are not paying a higher price for a product which is increasingly scarce, because the scarcity is not apparent in the demand-supply relation on the spot market (Salz *et al.* 2007). Indeed Whittaker (2004) noted how the increasing reliance on imports of fish to the UK market have insulated the UK consumer from the fluctuations in the UK domestic fish stocks.

Certification Schemes

Gulbrandsen (2009) undertook an analysis of the Marine Stewardship Council and considered that the MSC has contributed to more open management processes in certified fisheries but that environmental benefits from the scheme may take longer to be seen. In a report commissioned by the MSC, Purvis (2009) highlighted environmental, social and economic benefits that had come as a result of MSC certification across the first forty two fisheries to be certified.

Box 9 gives an indication of the number of fisheries in the UK that have gained MSC certification.

Attitudes to Sourcing of Fish

In a report regarding fish certification and eco-labelling, the OECD and FAO (2009) highlighted that sustainability is difficult to market. It is becoming clear that despite consumers stated interests in the environmental impacts of their purchasing decisions, their actual buying behaviour, especially in relation to food, is more likely to be determined by other factors. The current global financial crisis has seen consumer confidence fall and their behaviour increasingly influenced by price. The industry therefore cannot rely on consumers being prepared to pay a price premium for sustainable fish and seafood. Affordability has to be built into the equation.

Part of the debate at the OECD and FAO round table meeting in 2009 was the role that eco-labelling has played in management and fishers' behaviour. The report says: *"To date there has been little concrete evidence of the impact of eco-labelling and*

Box 9: UK Fisheries with MSC Certification

There are a number of UK fisheries that now have MSC certification. These include:

- The North Sea herring fishery (2008) operated by the Scottish Pelagic Sustainability Group (SPSG) working 25 modern trawlers 60-70m long.
- SPSG has also gained certification for its mackerel fishery in 2009.
- The Loch Torridan nephrops creel fishery gained certification in 2008.
- The Stornoway nephrops trawl fishery gained certification in 2009.
- The North Eastern Sea Fisheries Committee sea bass fishery was certified in 2007.
- The Thames Blackwater herring drift-net fishery was certified in 2000 and recertified in 2005.
- Hastings fleet pelagic herring and mackerel (two fisheries) certified in 2005
- Burry Inlet cockle fishery first certified in 2001 and again in 2007.
- The South West of England handline mackerel fishery was certified as sustainable in August 2001 and recertified in February 2007.

Source: http://www.msc.org/

certification on improvements in fisheries management and sustainability." It speculates that eco-labelling has achieved more as a marketing tool than as a conservation one although the report does go on to say that *"After over a decade of experience, evidence is coming to light that suggests that eco-labelling and certification might indeed be leading to better management…"* Indirectly this seems to be having some impact of fishers' behaviour through the purchasing behaviour of the fish retail industry rather than through the direct demands of the public.

Political Impacts

The current state of the fisheries and the fishing industry in the UK and the EU has both been shaped by and has shaped the policy and management processes. The CFP Green Paper (EC,2009) stated that an important consequence of the vicious circle of overfishing, overcapacity and low economic resilience within EU fisheries is high political pressure to increase short-term fishing opportunities at the expense of the future sustainability of the industry. Sustained political and economic pressure has led industry and Member States to request countless derogations, exceptions and specific measures. In his analysis of the effectiveness of the CFP, Holden (1994) observed that *"the overriding reason, illustrated by all examples describing attempts to increase minimum mesh sizes, implement effective seasonal bans and decrease TACs, is that the Council is reluctant, even opposed, to adopting regulations which result in short-term adverse consequence for the fishing industry. These are the consequence of every conservation measure because they are proposed only when there is a problem; adopting measures in order to avoid creating a problem is politically not even an option to be considered*".

Having said this the greatest effect that fisheries management policies have had is the fall in employment within the sector which has halved since 1965 with the loss of some 12,000 jobs. The political will to support the sector seems to apply to the number of vessels and the fishing opportunity rather to the employment of the crews.

The pressures of achieving a balance between short-term costs and long-term benefits are further compounded by the capacity of the fishing industry to continually adapt. This adaptation often serves to minimise the short-term costs at the expense of long-term benefits. Rosenburg (2007) described how current fisheries management policy always seems to be trying to catch up to the adaptability of fishers in finding new and more efficient ways to fish. As a result, management methods change in detail constantly, causing more stress to the industry and community. Fishing, like any business, requires a stable and predictable regulatory environment, and fisheries management is anything but stable these days. This cycle was eloquently described by, Poul Degnbol, as the "death spiral of fisheries micromanagement". Not only are adaptation and increased regulation of inputs ineffective: they lose legitimacy in the eyes of the industry. The burden of making conservation work is placed on the regulatory bodies, not on the industry, and activities not outcomes become the focus. Although management has apparently become overwhelmed by the details of fishing, it should focus more on the conservation of resources and the ecosystems subjected to fishing. The industry is forced to work around the regulations rather than making conservation work. As the CFP Green Paper (EU 2009) concluded, documenting, deciding, implementing and controlling the vast and diverse European fisheries through such micromanagement is increasingly complex, difficult to understand and very costly to manage and control.

Summary And Conclusions

Fisheries policies affect people in different ways and at different times and assessments which demonstrate the actual effects of specific fisheries policies are not common. This is perhaps because of the complex factors and relationships that influence the path of policy objectives to real life change. This complexity makes the challenge of identifying linear (or cause and effect) relationships very difficult indeed.

However, with the limited information that exists regarding specific policy measures and the more general overview of the current socio-economic context of the UK fisheries industry it has been possible to identify some key trends and issues that are reflective the socio-economic impacts of fisheries policy in the UK:

- Fleet structural measures seem to have been largely ineffective in reducing the UK fishing capacity in line with fishing opportunities.
- Whilst the UK fishing fleet has undergone some major restructuring in the past due to the loss of distant water fishing grounds, recent declines in the indicators of fleet size have been largely offset by efficiency gains.
- Three quarters of the fleet remains made up of smaller inshore vessels scattered across the country. However, these vessels represent only 9% of the fleet capacity.
- Most vessels, especially when investment costs are factored into the equations, are not making large profits and most remain operational because of subsidies.
- Employment in the fisheries sector has fallen from 47,824 in 1938 to 12,761 in 2008 but has stabilised over the last four years. Changes within the industry are also acting as a deterrent to young people considering joining the sector.
- The structural changes in the fleet have had significant impacts on fishing communities with some communities losing their identity as fishing ports, others becoming virtual fishing ports but some remaining dependent on the fishery.
- Fishing is one of the most dangerous businesses to be in, and risk and uncertainty have increased in the sector, but the number of fatalities has not declined in spite of investments in safety in the sector.
- Subsidies have helped the profitability of the UK fishery especially when the potential burden of cost recovery is considered. For many in the fishery subsidies are now built into business plans and are part of operational income.
- Little is known about the socio-economic impact of technical measures.
- Research globally suggests that MPAs are likely to affect different groups in different ways at different timescales. Understanding the different effects is critical to appreciating the incentives that stakeholder groups have for supporting or opposing MPAs.

- Certification systems have enabled well managed fisheries to be recognised but the extent to which that translated into financial benefits for fishers or environmental benefits is unclear.
- The public are confused about the meaning of the different systems and the preference for fish from sustainable stocks is driven more by retailers than by the public.
- The availability of fish to the wider public has been increasing largely dues to imports, and prices have remained static in spite of the state of the stocks.

7. REFERENCES CITED IN THE DOCUMENT

The references are sorted by section.

The Importance and Diversity of Socio Economic Information

Curtis, H. (2009). Profitable Futures for Fishing: Final Report. Edinburgh, SEAFISH**:** 1-151.

Degnbol, P., Gislason, H., Hanna, S., Jentoft, S., Raakjaer, J., Sverdrup-Jensen, S. and Wilson, D. C. (2006). Painting the Floor with a Hammer: Technical Fixes in Fisheries Management. Marine Policy **30**: 534-543.

Dryzek, J. S. (2005). The Politics of the Earth, Oxford University Press.

McGoodwin, J. R. (1990). Crises in the World's Fisheries: People, Problems and Policies. Stanford, Stanford University Press.

Salz, P., E. Hoefnagel and Vale C. (2007). State of the Art of European Fisheries Research in Economics and Other Social Sciences.

Policy and Management Strategies

Daan, N. (1997). "TAC Management in the North Sea Flatfish Fisheries." Journal of Sea Research **37**: 321-341.

Earll, R. and S. Gubbay (2006). Investigation into the Interactions between Socio-economic and Ecological Objectives Relevant to UK shelf Seas. CMS Report.

EC (2006). Towards a Maritime Policy for the Union: A European Vision for the Oceans and Seas. Brussels, European Commission.

EC (2009). Green Paper - Reform of the Common Fisheries Policy.

Gezelius, S. S. and J. Raakjaer (2008). Making Fisheries Management Work: Implementation of Policies for Sustainable Fishing, Springer.

Hilborn, R. (2007). Defining Success in Fisheries and Conflicts in Objectives. Marine Policy **31**: 153-158.

Holden, M. (1994). The Common Fisheries Policy. Oxford, Fishing news Books.

Jentoft, S. (2006). Beyond Fisheries Management: The Phronetic Dimension. Marine Policy **30**: 671–680.

Laxe, F. G. (2009). Dysfunctions in Common Fishing Regulations." Marine Policy **34**: 182-188.

Munro, G. and U. R. Sumaila (2002). The Impact of Subsidies upon Fisheries Management and Sustainability: the case of the North Atlantic. FISH and FISHERIES **3**: 233-250.

Schwach, V., Bailly, D., Christensen, A.-S., Delaney, A. E., Degnbol, P., van Densen, W. L. T., Holm, P., McLay, H. A., Nielsen, K. N., Pastoors, M. A., Reeves, S. A. and Wilson, D. C. (2007). Policy and Knowledge in Fisheries Management: a policy brief. ICES Journal of Marine Science **64**: 798–803.

Symes, D. and E. Hoefnagel (2009). Fisheries Policy, Research and the Social Sciences in Europe: Challenges for the 21st century. Marine Policy **34**: 268-275.

Symes, D. and J. Phillipson (2009). Whatever became of Social Objectives in Fisheries Policy? Fisheries Research **95**: 1–5.

Intended Socio-economic Impacts

Churchill, R. (1987). EEC Fisheries Law, Martinus Nijhoff Publishers.

DEFRA (2005). Charting a New Course, DEFRA.
http://www.defra.gov.uk/foodfarm/fisheries/documents/fisheries/newcourse.pdf

DEFRA (2007). Fisheries 2027.
http://www.defra.gov.uk/foodfarm/fisheries/documents/fisheries2027vision.pdf

EC (2009). Green Paper - Reform of the Common Fisheries Policy.

HM-Gov., Scottish-Government, Northern Ireland Assembly & Welsh Assembly Government (2009). Our seas – a shared resource: High level marine objectives.

Holden, M. (1994). The Common Fisheries Policy. Oxford, Fishing news Books.

Symes, D. (1998). The Integration of Fisheries Management and Marine Wildlife Conservation. Peterborough, JNCC**:** 1-97.

Symes, D. and J. Phillipson (2009). Whatever became of Social Objectives in Fisheries Policy? Fisheries Research **95**: 1–5.

Tingley, D. (2006). Northern Ireland Fleet Futures Analysis (2004-2013) - Methodology and Results. Belfast, Sea Fisheries Division Department of Agriculture and Rural Development Northern Ireland (DARDNI)

Context, Influencing Factors and Fishers Response

Agnew, D. (2004). Stock Projections and Management Options; Prime Ministers Strategy Unit.

Asche, F., Eggert, H. k., Gudmundssonc, E., Hoffd, A. and Pascoe, S. (2008). Fisher's Behaviour with Individual Vessel Quotas - Over-Capacity and Potential Rent - Five Case Studies. Marine Policy **32**: 920–927.

Brookfield, K., T. Gray & J. Hatchard (2005). The Concept of Fisheries-Dependent Communities. A comparative analysis of four UK case studies: Shetland, Peterhead, North Shields and Lowestoft." Fisheries Research **72**: 55–69.

Butcher, D. (1979). The Driftermen, Tops'l Books.

Butcher, D. (1982). Living from the Sea, Tops'l Books.

Butcher, D. (1987). Following the Fishing, Tops'l Books.

Churchill, R. (1987). EEC Fisheries Law, Martinus Nijhoff Publishers.

Coull, J. R. (1972). The Fisheries of Europel: An Economic Geography. London, G. Bell and Sons Ltd.

Cunningham, S., Dunn, M. and Whitmarsh D..(1985). Fisheries Economics an Introduction. London, Mansell Publishing Limited.

Cushing, D. H. (1968). Fisheries Biology: A Study in Population Dynamics, The University of Wisconsin Press.

Delaney, A. E., McLay, H. A. and van Densen, W. L. T. (2007). Influences of Discourse on Decision-Making in EU Fisheries Management: the case of North Sea cod (Gadus morhua). " ICES Journal of Marine Science, **64**: 804–810.

EC (2009). Green Paper - Reform of the Common Fisheries Policy.

ESRC (2008). Change and Continuity in Scotlands Fishing Communities, ESRC Seminar Series Mapping the public policy landscape.

Fairlie S., Haglar M. and B. O'Riordan (1995). The Politics of Overfishing. The Ecologist. Volume 25 No 2/3. Sturminster Newton, Ecosystems Ltd.

FAO (2009). The State of World Fisheries and Aquaculture. Rome, FAO**:** 176.

Haapasaari, P., Michielsens, C. G. J., Karjalainen, T. P., Reinikainen, K. and Kuikka, S. (2007). Management Measures and Fishers' Commitment to Sustainable Exploitation: a case study of Atlantic salmon fisheries in the Baltic Sea.,." ICES Journal of Marine Science **64**: 825–833.

Hardin, G. (1968). The Tragedy of the Commons. Science **162**(3859): 1243-1248.

Hatcher, A., Jaffry, S., Thebaud, O. and Bennett, E (2000). Normative and Social Influences Affecting Compliance with Fishery Regulations. Land Economics **76**(3): 448-461.

Hilborn R. (1985). Fleet Dynamics and Individual Variation: why some people catch more the others. Canadian Journal of Fisheries and Aquatic Science **42**, 2-13.

Hilborn, R. (2007). Defining Success in Fisheries and Conflicts in Objectives. Marine Policy **31**: 153-158.

Holden, M. (1994). The Common Fisheries Policy. Oxford, Fishing news Books.

Jones, P. J. S. (1999). Economic and Sociocultural Priorities for Marine Conservation. Effects of fishing on non-target species and habitats: biological, conservation and socio-economic issues. M. J. Kaiser and S. J. de Groot. Oxford, Blackwell Science.

Jonsson, H. (1982). Friends in Conflict: The Anglo-Icelandic Cod Wars and the Law of the Sea. London, C. Hurst and Company.

Kaplan I. M. and, McCay B. J. (2004). Cooperative Research, Co-management and the Social Dimension of Fisheries Science and Management. Marine Policy **28**:257–258.

Leigh, M. (1983). European Integration and the Common Fisheries Policy. Beckenham, Croom Helm Ltd.

MacGarvin M. and Jones S. (2000). Choose or Loose: A recovery plan for fish stocks and the UK fishing industry. WWF, Godalming, UK.

Marshall N.A. (2007). Can Policy Perception Influence Social Resilience to Policy Change? Fisheries Research **86:** 216-227.

Mikalsen, K. H. and S. Jentoft (2008). Participatory Practices in Fisheries across Europe: Making stakeholders more responsible. Marine Policy **32**: 169–177.

McGoodwin, J. (2001). Understanding the Cultures of Fishing Communities: A Key to Fisheries Management and Food Security. Rome, FAO**:** 287 pp.

Munro, G. and U. R. Sumaila (2002). The Impact of Subsidies Upon Fisheries Management and Sustainability: the case of the North Atlantic. FISH and FISHERIES **3**: 233-250.

OECD (2009). Reducing Fishing Capacity: Best Practices for Decommissioning Schemes. Paris, OECD.

OECD and FAO (2009). Round Table on Eco-labelling and Certification in the Fisheries sector. FAO**:** 52.

Ostrom E. 1990. Governing the Commons: The evolution of institutions for collective action. Cambridge University Press, New York.

Pollard, V. (2004). Fishing Communities and Regional Development, Prime Ministers Strategy Unit.

Roberts, C. (2007). The Unnatural History of the Sea: The Past and Future of Humanity and Fishing, Island Press.

Robinson, R. (1996). Trawling: The Rise and Fall of the British Trawl Fishery, University of Exeter Press.

Rochet, M.-J., Prigent, M., Bertrand, J. A., Carpentier, A., Coppin, F., Delpech, J.-P., Fontenelle, G., Foucher, E., Mahé, K., Rostiaux, E. and Trenkel, V. M .(2008). Ecosystem Trends: evidence for agreement between fishers' perceptions and scientif information. ICES Journal of Marine Science **65**:1057-1068.

Rose, C., Dade, P. and Scott J. (2008). Qualitative and Quantitative Research into Public Engagement with the Undersea Landscape in England. Natural England Research Reports.

Salas S. and D. Gaertner (2004). The Behaviour Dynamics of Fishers: management implications. Fish and Fisheries **5**, 153-167.

Shelton, P. A. (2009). Eco-certification of Sustainably Managed Fisheries—Redundancy or synergy? Fisheries Research **100**: 185–190.

Starkey, D., C. Reid, and Ashcroft N. (2000). England's Sea Fisheries: The Commercial Sea Fisheries of England and Wales since 1300. London, Chatham Publishing.

Suarez de Vivero, J. L. S. d., Juan C. Rodrý guez Mateosa, et al. (2008). The Paradox of Public Participation in Fisheries Governance: The rising number of actors and the devolution process. Marine Policy **32**: 319–325.

Sutinen, J. G. (2008). Major Challenges for Fishery Policy Reform: A Political Economy Perspective, OECD Food, Agriculture and Fisheries Working Papers, No. 8, OECD Publishing.

Symes, D. (1998). The Integration of Fisheries Management and Marine Wildlife Conservation. Peterborough, JNCC**:** 1-97.

Symes, D. and J. Phillipson (2009). Whatever Became of Social Objectives in Fisheries Policy? Fisheries Research **95**: 1–5.

Cabinet-Office (2004). Net Benefits - A Sustainable and profitable future for UK fishing.

Thompson, P., T. Wailey and Lummis T. (1983). Living the Fishing, Routledge and Kegan Paul.

UN (1982). U.N. Convention on the Law of the Sea, 1982.

Valcic B. (2009). Spatial Policy and the Behaviour of Fishermen. Marine Policy **33**, 215-222.

Vaze, P. and D. Tingley (2004). Fishermen's incentives and policy, Prime Ministers Strategy Unit.

World_Bank (2006). Where is the Wealth of Nations? Washington, the World Bank.

Actual Socio Economic Impacts of Policy and Management Measures

Alban, F., G. Appereand Boncoeur, J. (2006). Economic Analysis of Marine Protected Areas: A literature review, EMPAFISH Project.

Anderson, J., Curtis, H., Stewart, A.-M. and McShane, H. (2006). 2006 Economic Survey of the UK Fishing Fleet. Edinburgh, Seafish**:** 1-128.

Asche, F.,et al. (2008). Fisher's Behaviour with Individual Vessel Quotas - Over-Capacity and Potential Rent - Five Case Studies. Marine Policy **32**: 920–927.

Brookfield, K., T. Gray & J. Hatchard (2005). The Concept of Fisheries-Dependent Communities. A comparative analysis of four UK case studies: Shetland, Peterhead, North Shields and Lowestoft. Fisheries Research **72**: 55–69.

Brown (2008). 2008 Survey of the UK Seafood Processing Industry, SEAFISH.

Cabinet-Office (2004). Net Benefits - A Sustainable and Profitable Future for UK Fishing.

EC (2009). Green Paper - Reform of the Common Fisheries Policy.

ESRC (2008). Change and Continuity in Scotland's Fishing Communities, ESRC Seminar Series Mapping the public policy landscape. http://www.esrc.ac.uk/ESRCInfoCentre/Images/Change%20and%20continuity%20in%20Scotland%27s%20fishing%20communities_tcm6-26382.pdf

FAO. 2004. Future Prospects for Fish and Fishery Products: Medium - term projections to the years 2010 - 2015. *FAO Fisheries Circular,* FIDI/972 - 1. Rome, FAO

FAO (2009). The State of World Fisheries and Aquaculture. Rome, FAO**:** 176.

Goulding, I., Hallam, D., Harrison-Mayfield, L., Mackenzie-Hill, V. and Silva, H. d. (2000). Regional Socio-economic Studies on Employment and the Level of Dependency on Fishing. Commission of the European Communities, Directorate-General for Fisheries, Lot No. 23: Coordination and Consolidation Study - Final Report. Prepared by MegaPesca Lda (Portugal) in collaboration with Centre for Agricultural Strategy (UK).

Gulbrandsen, L. (2009). The Emergence and Effectiveness of the Marine Stewardship Council. Marine Policy 33: 654–660.

Hatchard, J. (2007). Using Socio-economic Information in European Marine Site Management: UK shellfisheries. Edinburgh, JH Fishery Management Services.

Heikinheimo, O., Setäläb, J., Saarni, K. and Raitaniemi, J. (2006). Impacts of Mesh-size Regulation of Gillnets on the Pikeperch Fisheries in the Archipelago Sea, Finland. Fisheries Research **77**(2).

Hilborn, R., Stokes, K., Maguire, J.-J., Smith, T., Botsford, L., Mangel, M., Orensanz, J., Parma, A., Rice, J., Bell, J., Cochrane, K. L., Garcia, S., Hall, S. J., Kirkwood, G. P., Sainsbury, K., Stefansson, G. and

Walters, C. (2004). When can Marine Reserves Improve Fisheries Management? Ocean & Coastal Management **47**: 197-205.

Holden, M. (1994). The Common Fisheries Policy. Oxford, Fishing news Books.

Jamieson, L., Munro, G. and Perrier, M. (2009). Social Change in Scottish Fishing Communities: A brief literature review and annotated bibliography. Edinburgh, Scottish Government Social Research**:** 1-33.

Jones, P. J. S. (1999). Economic and Sociocultural Priorities for Marine Conservation. Effects of fishing on non-target species and habitats: biological, conservation and socio-economic issues. M. J. Kaiser and S. J. de Groot. Oxford, Blackwell Science.

Just, F.P.R. (2004). Artisanal Fishing: prospects for Community Survival. ESRC End of Award Report, Swindon.

Laffoley, D. and M. Tasker (2004). Marine Environment, Prime Ministers Strategy Unit.

Lawrie, T. et al. (2004). The health and lifestyle of Scottish fishermen:a need for health promotion. Health Education Research.

Marine Fisheries Agency (2008). United Kingdom Sea Fisheries Statistics. http://www.mfa.gov.uk/statistics/documents/2008/UK-Sea-Fisheries-Statistics-2008.pdf

Matheson C., M. S., Murphy E., Lawrie T., Ritchie L., and Bond C. (2001). The Health of Fishermen in the Catching Sector of the Fishing Industry: A Gap Analysis. Occupational Medicine **51**(5): 305-311.

Munro, G. and U. R. Sumaila (2002). The impact of subsidies upon fisheries management and sustainability: the case of the North Atlantic. FISH and FISHERIES **3**: 233-250.

Palmer (2003). The Physical and Economic Accounts for UK Fisheries, Office of National Statistics.

Pollard, V. (2004). Fishing Communities and Regional Development, Prime Ministers Strategy Unit.

Pugh (2008). Socio-economic Indicators of Marine-Related Activities in the UK economy, The Crown Estate**:** 68 pages.

Purvis (2009). Net Benefits; The First Ten Years of MSC Certified Sustainable Fisheries. Report for the MSC.

Roberts, S. (2004). Occupational Mortality in British Commercial Fishing, 1976-95. Occup Environ Med 61: 16-23.

Rosenberg, A. A. and C. W. Glass (2007). Fishers' Responses to Management Measures and their Socio-economic Effects. ICES Journal of Marine Science **64(8)**: 1612-1613.

Salz, P., E. Hoefnagel and Vale C. (2007). State of the Art of European Fisheries Research in Economics and other Social Sciences.

Sanchirico, J. N., Cochran, K. A. and Emerson, P. M. (2002). Marine Protected Areas: Economic and Social Implications. Resources for the Future Discussion Paper 02-26.

Scottish Government (2009). Social Change in Scottish Fishing Communities: A brief literature review and annotated bibliography. www.scotland.gov.uk/Publications/2009/07/10100136/5

Seafish (undated). The Economic Impacts of the UK Sea Fishing and Fish Processing Sectors: An input-output analysis. Seafish, Edinburgh.

Stead, S. (2005). Changes in Scottish Coastal Fishing Communities—Understanding socio-economic dynamics to aid management, planning and policy. Ocean & Coastal Management **48**: 670–692.

Sumaila, U. and C. Armstrong (2006). Distributional and Efficiency Effects of Marine Protected Areas: A Study of the Northeast Atlantic Cod Fishery. Land Economics **82**(3): 321-332.

Symes, D. (1998). The Integration of Fisheries Management and Marine Wildlife Conservation. Peterborough, JNCC**:** 1-97.

Symes, D. and J. Phillipson (2009). Whatever Became of Social Objectives in Fisheries Policy? Fisheries Research **95**: 1–5.

Symes, D. and E. Hoefnagel (2009). Fisheries Policy, Research and the Social Sciences in Europe: Challenges for the 21st century." Marine Policy **34**: 268-275.

Vaze, P. and D. Tingley (2004). Fishermen's Incentives and Policy, Prime Ministers Strategy Unit.

Vivid-Economics (2008). The Economic Benefits of Fisheries Management: regulatory design for stock recovery, equity and an efficient fleet, DEFRA.

Whittaker, S. (2004). Industry Analysis and Regional Development, Prime Ministers Strategy Unit.

8. OTHER LITERATURE CONSULTED

Abdulla, A., Gomei, M., Hyrenbach, D., Notarbartolo-di-Sciara, G. and Agardy, T. (2009). Challenges Facing a Network of Representative Marine Protected Areas in the Mediterranean: prioritizing the protection of underrepresented habitats. ,." ICES Journal of Marine Science 66:

Affairs, M. o. F. (1995). Fisheries in Developing Countries: Towards Sustainable Use of Living Aquatic Resources. The Hague, Ministry of Foreign Affairs: 96pp.

Anon (2009). Scottish Sea Fisheries Statistics, 2008.

Board, C. F. (2008). Central fisheries Board Strategic Plan 2008-2010. Belfast, Central Fisheries Board.

Buxton, C. D., Haddon, M. and Bradshaw, M. (2006). Regional Impact Assessment for the Marine Protected Areas Proposed for the South-East Region. Hobart, Tasmanian Aquaculture and Fisheries Institute: 1-195.

Cardinale, M. and H. Sved¡§ang (2008). Mismanagement of Fisheries: Policy or science?" Fisheries Research 93: 244–247.

Catchpole, T. L., Frid, C. L. J. and Gray, T. S. (2006). Resolving the Discard Problem—A case study of the English Nephrops fishery." Marine Policy 30: 821–831.

CEFAS (2009). Creation of Multi Annual Management Plans for Commitment, CEFAS.

CEMARE (2007). Invest In Fish South West Option 3: 20% Effort Reduction by the UK Fleet. Portsmouth, CEMARE: 1-12.

CEMARE (2007). Invest in Fish South West, Option 3i: 20% Effort Reduction by the EU Fleet. Porstmouth, CEMARE: 1-12.

CEMARE (2007). Invest In Fish South West, Option 4: Increase in Mesh Size from 80mm to 90mm

for UK Beam Trawlers. Portsmouth, CEMARE: 1-12.

CEMARE (2007). Invest In Fish South West, Option 5: Increase in Mesh Size from 80mm to 100mm

for UK Beam Trawlers. Portsmouth, CEMARE: 1-12.

CEMARE (2007). Invest In Fish South West, Option 6: Use of Square Mesh Panels. Portsmouth, Cemare: 1-4.

CEMARE (2007). Invest In Fish South West, Option 7: Inshore Beaming Displaced in Area VIIe. Portsmouth, CEMARE: 1-5.

CEMARE (2007). Invest In Fish South West, Option 8: Trevose Seasonal Closure. Portsmouth, CEMARE: 1-4.

CEMARE (2007). Invest In Fish South West: Option 1: 10% Decommissioning of the UK Fleet. Portsmouth, Cemare: 1-12.

CEMARE (2007). Invest In Fish South West: Option 2: 20% Decommissioning of the UK Fleet. Portsmouth, CEMARE: 1-12.

Charles, A. and L. Wilson (2009). Human Dimensions of Marine Protected Areas. – , ." ICES Journal of Marine Science 66: 6–15.

Christensen, A.-S. and J. Raakjaer (2006). Fishermen's Tactical and Strategic Decisions: A case study of Danish demersal fisheries." Fisheries Research 81: 258–267.

Christie, D. M., Warren, D. J., Hanley, P. N., Murphy, D. K., Wright, P. R., Hyde, T. and Lyons, N. (2004). Developing Measures for Valuing Changes in Biodiversity. London, DEFRA.

Cohen, P., Valemei, A. D. and Govan, H. (2008). Annotated Bibliography on Socio-economic and Ecological Impacts of Marine Protected Areas in Pacific Island Countries. Penang, The WorldFish Centre. Bibliography No. 1870.: 36.

Communities, C. o. t. E. (2006). Green Paper. Towards a Future Maritime Policy for the Union: A European Vision for the Oceans and Seas. Brussels, European Commission: 1-49.

Coull, J. R. (1972). The Fisheries of Europe: An Economic Geography. London, G. Bell and Sons Ltd.

De Young C., Charles A. and Hjort A. (2008). Human Dimensions of the Ecosystem Approach to Fisheries: an Overview of Context, Tools and Methods. 152. FAO Fisheries Technical Paper, 489.

DEFRA (2009). Marine Programme Plan 2009/10. London, DEFRA.

Degnbol, P. (2005). Indicators as a Means of Communicating Knowledge. ICES Journal of Marine Science 62(3): 606-611.

Degnbol, P. and B. McCay (2006). Unintended and Perverse Consequences of Ignoring Linkages in Fisheries Systems. ICES Journal of Marine Science 64: 793–797.

del Valle, I. and K. Astorkiza (2007). Institutional Designs to Face the Dark Side of Total Allowable Catches. ICES Journal of Marine Science 64: 851–857.

Ecologic (2005). The Use of Market Incentives to Preserve Biodiversity.

EFTEC (2005). The Economic, Social and Ecological Value of Ecosystem Services: A Literature Review. London, Department for Environment, Food and Rural Affairs: 1-42.

Ehler (2008). Conclusions: Benefits, lessons learned, and future challenges of marine spatial planning. Marine Policy 32: 840– 843.

Environment, A. D. o. (2005). Socio-economic Impact: Assessment Toolkit; A guide to assessing the socio-economic impacts of Marine Protected Areas in Australia.

FAO (2008). Report of the Expert Consultation on the Assessment of Socio-economic Impacts of Aquaculture. Ankara, Turkey. FAO Fisheries Report. No. 861. Rome, FAO. 2008. 53p.

Garcia, S. M. and A. T. Charles (2007). Fishery Systems and Linkages: from clockworks to soft watches. ICES Journal of Marine Science 64: 580–587.

Gilliland, P. M. and D. Laffoley (2008). Key Elements and Steps in the Process of Developing Ecosystem-based Marine Spatial Planning. Marine Policy 32: 787– 796.

Glass, C. W. and C. A. Manning (2007). Fishery Forum on Integrating Fishing and Ecosystem Conservation: the way forward. ICES Journal of Marine Science 64(8): 1614-1615.

Government, W. A. (2008). Wales Fisheries Strategy. Cardiff, Food, Fish & Market Development Division, Department for Rural Affairs, Welsh Assembly Government.

Government, W. A. (2009). Wales Fisheries Strategy: Implementation Plan. Cardiff.

Gray, T. S. and J. Hatchard (2007). Environmental Stewardship as a New Form of Fisheries Governance. ICES Journal of Marine Science, 64: 786–792.

Graya, T., Hatchard, J., Daw, T. and Stead, S. (2008). New Cod War of Words: 'Cod is God' versus 'sod the cod'—Two opposed discourses on the North Sea Cod Recovery Programme. Fisheries Research 93: 1–7.

Greenpeace (2009). Assessment of the Marine Stewardship Council (MSC) Fisheries Certification Programme.

Hauck, M. (2008). Rethinking small-scale fisheries compliance. Marine Policy 32: 635–642.

Heen, K. and O. Flaaten (2007). Spatial employment impacts of fisheries management: A study of the Barents Sea and the Norwegian Sea fisheries. Fisheries Research 85: 74–83.

Hilborn, R. (2007). Managing Fisheries is Managing People: what has been learned? FISH and FISHERIES 8: 285–296.

Hoffmann, E. and A. Pérez-Ruzafa (2008). Marine Protected Areas as a Tool for Fishery Management and Ecosystem Conservation: an Introduction." ICES Journal of Marine Science 66: 1–5.

Holden, M. (2004). Alternative Policy Instruments for Fisheries Management. Prime Ministers Strategy Unit.

Holmes, J. and J. Lock (2008). Improving Communication Between Fisheries Managers and Researchers. MariFish.

Jentoft, S. (2005). Fisheries Co-management as Empowerment. Marine Policy 29: 1–7.

Jentoft, S. and R. Chuenpagdee (2009). Fisheries and Coastal Governance as a Wicked Problem." Marine Policy 33: 553–560.

Jones, P. J. S. and A. Carpenter (2009). Crossing the Divide: The challenges of designing an ecologically coherent and representative network of MPAs for the UK. Marine Policy 33: 737–743.

Kettunen, M. and P. ten Brink (2006). Value of Biodiversity: Documenting EU examples where biodiversity loss has led to the loss of ecosystem services, Institute for European Environmental Policy.

King, D. M. and J. G. Sutinen (2010). Rational Non Compliance and the Liquidation of Northeast Ground Fish Resources. Marine Policy 34: 7-21.

Le Quesne, T. and R. McNally (Undated). The Green Buck, WWF-UK.

Leach, M., Mearns, R. and Scoones, I. (1999). Environmental Entitlements: Dynamics and institutions in community-based natural resource management. World Development Vol. 27, (No. 2,): pp. 225±247.

Macfadyen, G. and T. Huntington (2007). Potential Costs and Benefits of Fisheries Certification for Countries in the Asia–Pacific Region. RAP PUBLICATION 2007/24.

Marifish (2006). Drivers for Fisheries Management.

McEvoy, D., Brandt, S., Lavoie, N. and Anders, S. (2009). The Effects of ITQ Management on Fishermen's Welfare When the Processing Sector Is Imperfectly Competitive. Land Economics 85(3): 470-484.

McGoodwin, J. (2001). Understanding the Cultures of Fishing Communities: A key to fisheries management and food security. Rome, FAO: 287 pp.

Mearns, R., Leach, M. and Scoones, I. (1997). The Institutional Dynamics of Community-Based Natural Resource Management: An entitlements approach. World Bank.

Morrison, S. M., C.; Murphy,E.; Lawrie,T.; Ritchie,L. D.; Bond,C. M. (2001). The Health of Fishermen in the Catching Sector of the Fishing Industry: A gap analysis. Occupational Medicine 51(5): pp305 - 311.

MRAG (2009). Review of Fish Sustainability Information Schemes: Final report. Commissioned by the Fish Sustainability Information Group.

Mumford, J. D., Leach, A. W., Levontin, P. and Kell, L. T (2009). Insurance Mechanisms to Mediate Economic Risks in Marine Fisheries. ICES Journal of Marine Science 66: 950–959.

Neiland, A., Shaw, S. A. and Bailly, D. (1991). The Social and Economic Impact of Aquaculture: A European review. CEMARE Research Paper.

Pagiola, S., von Ritter, K. and Bishop, J. (2004). How Much is an Ecosystem Worth? - Assessing the economic value of conservation. IUCN

Pascoe, S. (2006). Economics, Fisheries, and the Marine Environment. ICES Journal of Marine Science: 63(1):1-3.

Pedersen, S. A., Fock, H., Krause, J., Pusch, C., Sell, A. L., Böttcher, U., Rogers, S. I., Sköld, M., Skov, H., Podolska, M., Piet, G. J. and Rice, J. C. (2009). Natura 2000 Sites and Fisheries in German Offshore Waters. ICES Journal of Marine Science 66: 155–169.

Perez-Labajos, C. (2008). Fishing Safety Policy and Research. Marine Policy 32: 40-45.

Perrings, C. and R. Ferris (2004). Research Strategy for Socio-economic and Biodiversity Research Perspectives Relevant to the Delivery of the UK Biodiversity Action Plan, UK BRAG.

Plasman, C. (2008). Implementing Marine Spatial Planning: A policy perspective. Marine Policy 32: 811– 815.

R., C. and A. V. Lowe (1983). The Law of the Sea. Manchester, Manchester University Press.

Ricea, J. C. and M.-J. Rochet (2005). A Framework for Selecting a Suite of Indicators for Fisheries Management. ICES Journal of Marine Science 62(3): 516-527.

Roberts, S. (2004). Occupational Mortality in British Commercial Fishing, 1976-95." Occup. Environ. Med. 61: 16-23.

Salz, P. (2006). Economic Performance of EU Fishing Fleets and Consequences of Fuel Price Increase. Conference on Energy Efficiency in Fisheries, Brussels, 11-12 May 2006.

Sanchirico, J. (2000). Marine Protected Areas as Fishery Policy: A discussion of potential costs and benefits.

Santo, E. M. D. and P. J. S. Jones (2007). Offshore Marine Conservation Policies in the North East Atlantic: Emerging tensions and opportunities. Marine Policy 31: 336–347.

SEAFISH (2008). Scottish Fleet Financial Performance 2008 Mid-Year Review. SEAFISH: 1-26.

Sewell, J. H., K. (2005). Effects of Fishing within UK European Marine Sites: Guidance for nature conservation agencies. Plymouth: Marine Biological Association. Report to the Countryside Council for Wales, English Nature and Scottish Natural Heritage from the Marine Biological Association.

Smith, R. J., P. D. Eastwood, et al. (2009). Developing Best Practice for Using Marxan to Locate Marine Protected Areas in European waters. ICES Journal of Marine Science 66: 188–194.

Suuronen, P., PekkaJounela, et al. (2010). Fishermen Responses on Marine Protected Areas in the Baltic Cod fishery. Marine Policy 34: 237–243.

Symes, D. (2007). Fisheries Management and Institutional Reform: a European perspective. ICES Journal of Marine Science 64: 779–785.

Symes, D. and E. Hoefnagel (2010). Fisheries Policy, Research and the Social Sciences in Europe: Challenges for the 21st century. Marine Policy 34: 268-275.

Thomas, J. S., Johnson, G. D. and Formichella, C. M. (2000). Monitoring the Socio-Economic Impacts of Federal Regulations on Gulf of Mexico Commercial Shrimp Fishermen, NOAA.

Tingley, D. (2005). UK Fleet Futures Modelling (2004-2013) - Literature Review. Portsmouth, Cemare: 1-22.

Townsend, R., Shotton, R. and Uchida, H. (2008). Case Studies in Fisheries Self-Governance. FAO Fisheries Technical Paper. No. 504.

Van Densen, W. L. T., and McCay, B. J. (2007). Improving Communication from Managers to Fishers in Europe and the US. ICES Journal of Marine Science 64: 811–817.

Vivero, J. L. S. d., Juan C. Rodrý guez Mateosa and Corral, D. F. d. (2008). The Paradox of Public Participation in Fisheries Governance. The rising number of actors and the devolution process. Marine Policy 32: 319–325.

Watson, J. and J. Bryson (2003). The Clyde Inshore Fishery Study (Key Features). Edinburgh, Seafish.

Wattage, P. (2001). A Targeted Literature Review - Contingent Valuation Method. CEMARE Research Paper.

Whitmarsh, D. (1998). Socio-Economic Implications of Alternative Fisheries Management Strategies. CEMARE Research Paper.

Whitmarsh, D. and M. Giovanna-Palmieri (2009). Social Acceptability of Marine Aquaculture: The use of survey-based methods for eliciting public and stakeholder preferences. Marine Policy 33: 452-457.

Wilson, D. C. (2001). Three Complementary Approaches to Understanding the Use of Scientific Claims in Environmental Debates. Institute for Fisheries Management Research Publication Series Presentation to the Nordic Workshop on Conflicts between Protected Species and Fisheries, Finnish Environmental Institute, Helsinki, Finland, 12-13 August 2001.